The Magazine of the Registered Professional Engineer

American Engineer

OCTOBER 1961

Aid for Engineers in School:

Million-Dollar Money Tree

(page 19)

31

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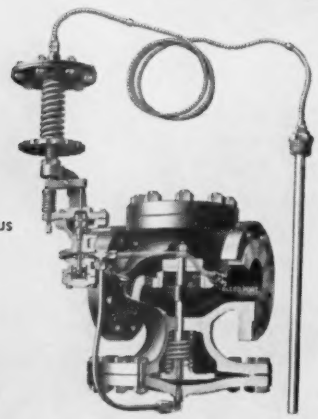
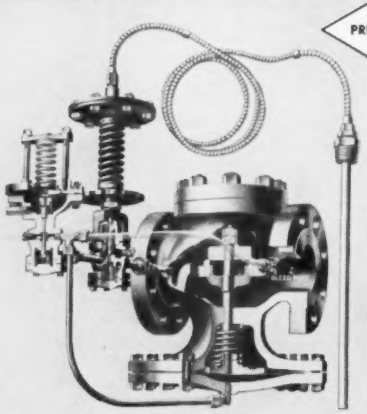
VALVE TIPS:

How to Select Automatic Regulating Valves For Temperature Control

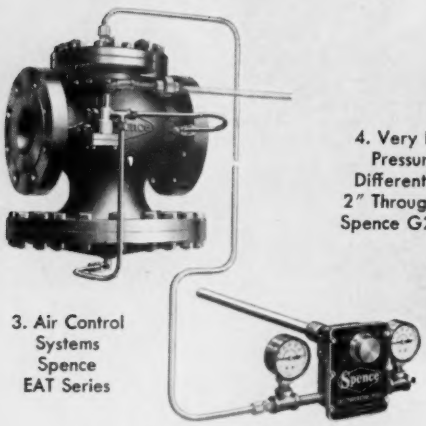
THE MOST COMPLETE LINE OF PRESSURE AND TEMPERATURE REGULATORS IN THE WORLD



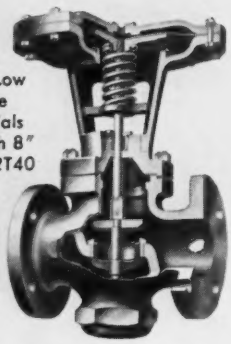
1. Instantaneous Heaters Spence ET124 Series



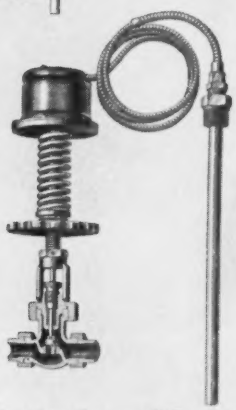
2. Storage Heaters Spence ET14D



3. Air Control Systems Spence EAT Series



4. Very Low Pressure Differentials 2″ Through 8″ Spence G2T40



5. Very Low Pressure Differentials Up Through 2″ Valves Spence Direct Acting T2

During the past year, our field representatives have reported many cases of improperly, and uneconomically, applied temperature regulators. To help you avoid some of these costly mistakes, here are a few tips on selecting the most effective and economical temperature regulating valves for your applications.

1. Instantaneous heaters require a special action for close temperature control and freedom from hunting. In the Spence ET124 series, steam pressure is modulated according to temperature (demand) and is automatically regulated at any pressure established by the demand.
2. Storage heaters, on the other hand, are more economically controlled by the Spence ET14D, which includes a simple temperature-actuated pilot that opens and closes the main valve to maintain a constant temperature.
3. Air control systems can now have a ±5°F control accuracy under wide and instantaneous load swings with the Spence EAT regulator. Engineers report savings of up to 50% in installed costs with this recently developed Spence cascade system when it has been used in place of conventional instrumentation.
4. For the combination of very low pressure differentials and air or water control, Spence recommends Type G2T40. This single seated valve provides fast, positive response in 2″ through 8″ valves. Double seat Type G22 is also available in 10″ through 12″.
5. When very low pressure differential is encountered with valves of 2″ or less, the Spence direct operated T2 is recommended. The sensitive vapor tension thermostat responds quickly to small changes in bulb temperature for continuous, accurate control.

In this brief description of industrial process and heating temperature control, we have given a few important tips in proper regulator selection. If you would like more detailed information on these control applications, write for the new Spence Temperature Control Bulletin IV 1014. SE-150

SPENCE ENGINEERING COMPANY, INC.
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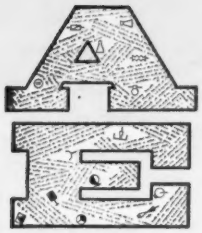
(Circle 1 in Readers' Service Dept.)



"This Month"

Questions: What is available to the engineer as regards fellowships and grants? Who provides them and how are they administered? Answer: "The Million-Dollar Money Tree"—page 19, tells all.

And our second lead "This Month" is "Education for the Engineer and the Scientist" wherein the director of engineering for Libby-Owens-Ford reviews changes all in industry may expect during the 1960's. Page 25.

A staff piece—"Mathematics Goes Modern"—will surprise many an engineer who has been out of school for some time. There have been changes and most agree for the better. You'll enjoy this timely report beginning on page 30.

For color and charm don't miss the article about Engineer Kamla Yadav and "A Case of Logic," page 33. This is about a young man from India and his work in American industry.

There is still some grumbling about the value of a P.E. license, especially for the man in industry. If this thought has crossed your mind—and no doubt it has—you will find "The P.E. License—What It Means to Industry's Engineers" most elucidating. On page 35.

Consulting engineers in private practice play an ever increasing role in the creation of our huge government projects. Page 39 brings us a piece on "how and why" private enterprise figures in the picture.

"This Month's" Board of Ethical Review case report is on page 38 and deals with competitive bidding. And don't miss the NSPE Fall Meeting story on page 42.

Now, for the news:

General. Page 8. New Mexico SPE Acts on Payola Through Members . . . NSPE Represented Among Patent Week Sponsors.

Consulting. Page 9. Five Groups Compile Paper on Engineering for Government (full Position Paper is published—Ed.)

Industry. Page 12. Engineers Excluded from Union Vote by NLRB . . . NSPE Policy Presented to House Subcommittee . . . Engineers Number High Among AEC Personnel . . . Survey Shows Graduates Decide Early About Jobs . . . Recent Events Show Some Gains, Some Losses for Unions . . . Professionals in Oregon Given Separate Treatment.

Education. Page 14. Carnegie to Assist Planning Pakistan Engineering School . . . 6½ Percent Increase Reported for College Faculty Pay.

Government. Page 15. CSC Head Urges Cooperation at Meeting With Engineers . . . Bill to Permit Two-Step Promotion Passes House . . . Per Diem Rate Raised for Federal Employee Travel . . . Kennedy Orders Review of Outside R&D Projects.

Kenneth E. Trombley
Editor

Letters to the Editor

► ***Editor's Note:*** **In the June, 1961, issue of the AE there appeared an article entitled "Toward a More United Profession" by Garvin H. Dyer, P. E., chairman of the Inter-Society Relations Committee, and former NSPE president. In the article, Mr. Dyer proposed a plan that would, briefly stated, create a new classification of NSPE membership under which certain qualified but unregistered engineers would be allowed to join the NSPE. The comments below are a few received in response to the article.**

Pros . . .

Dear Editor:

The Executive Board of the San Jacinto Chapter, Texas SPE, by unanimous action at our recent Board meeting directed me as president to inform you that the Board, representing some 1500 chapter members, is in full support of the position proposed in the article, "Toward A More United Profession," in the June, 1961, issue of the AMERICAN ENGINEER.

It seems to us that the National Society would strengthen its position immeasurably as a representative of the engineering profession if we could enlist the active support of the many unquestionably well qualified, but unregistered, engineers in our profession.

The subject of unity in our profession has been discussed on a number of occasions in the San Jacinto Chapter meetings and there appears to be a definite crystallization of thought in support of the Functional Plan as proposed by the AIEE with possible minor modifications.

JACK L. BATTLE, P.E.
Houston, Tex.

Dear Editor:

. . . I have discussed the proposed plan with officers and members of the Canal Zone Society of Professional Engineers. . . . The Canal Zone Society is of the opinion that the National Society must get a larger representation in membership to become effective in furthering the interests of the professional engineer. It favors temporary foregoing of registration as a requirement for membership of those in the higher grades of membership in the technical societies. Such membership should be something less than full membership. Only registered engineers should be considered for full membership in the society.

R. C. STOCKHAM, P.E.,
National Director, CZSPE,
Balboa Heights, C.Z.

Dear Editor:

At a Board of Directors meeting of the Delaware SPE the plan suggested for extending NSPE membership to qualified but nonregistered engineers was discussed. All members of our Board were present and voted unanimously in favor of proceeding with the plan as proposed. We have no suggested changes and I am sure that Delaware will back any plan that conveys the intent of the one proposed.

In Delaware it will be necessary to change the DSPE Constitution to incorporate the suggested plan. We will proceed to do this at the appropriate time once the pattern has been set by NSPE.

JAMES H. HALLETT, JR., P.E.
National Director, DSPE,
Wilmington, Del.

Dear Editor:

A recommendation has been made by the Inter-Society Relations Committee . . . regarding the suggested plan for extending NSPE membership to qualified but nonregistered engineers.

I wish to advise that this matter has been discussed with some of the officers of the western chapters of MSPE and there seems to be a feeling that it is an excellent move on the part of NSPE. This question was also discussed at the MSPE Annual Board Meeting in June of 1961 and a vote taken as to the feeling of all members present. This vote included not only Board members, but all members of the MSPE present. The entire body was in favor of the plan as presented. There was not a dissenting vote in the group.

ARLOW V. FERRY, P.E.,
National Director, MSPE,
Kansas City, Mo.

Dear Editor:

This letter is meant to register my personal approval of the Dyer plan with the recommendation that the necessary steps be expedited for the earliest possible vote on a constitutional amendment.

JOHN F. ARMSTRONG, P.E.
Dallas, Tex.

Dear Editor:

The Mississippi SPE held its summer meeting the week after my return from the NSPE Annual Meeting held in Seattle. As requested, I discussed the matter of extending NSPE membership to qualified nonregistered engineers with the State Board of Directors and on the floor of the convention.

As you might expect, the Board of Directors had a much better chance to discuss the matter and they gave their support to the plan as proposed. On the floor of the convention considerable discussion ensued for and against the proposed plan of admitting nonregistered engineers to NSPE membership. The Mississippi Society voted approval of the plan to submit the matter to the membership for vote, but without obligating the Society or any individual member either for or against the plan. I believe this action would be expected.

I personally feel that the proposed plan is an excellent one and provides all the safeguards we could expect. The Board of Directors of the Mississippi Society concurs in this view. I am personally of the opinion that a majority of the MSPE would vote in favor of this plan if it were submitted to a vote at this time. Of course, we can expect some opposition. I feel that NSPE must make some concessions and if this proposed plan will do the trick, I will personally support it to the best of my ability.

HARRY SIMRALL, P.E.
National Director, MSPE
State College, Mississippi

Cons . . .

Dear Editor:

I have noted from the summary of the Annual Meeting held in Seattle, Washington, that the major Board action was to endorse a proposal to open Society membership to qualified but nonregistered engineers.

It is my belief that if an engineer is qualified he will exert sufficient energy, time and the small expenditure to become registered. Thus I would like to express my opinion that Society membership should not be opened to nonregistered engineers.

JOEL H. DAVIS, JR., P.E.
Newport, N. C.

(Continued on page 6)

American Engineer

OCTOBER 1961
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NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS FOUNDED 1934

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(Circle 2 in Readers' Service Dept.)

(Continued from page 4)

Dear Editor:

NSPE enjoys the reputation of exclusiveness due to the present restrictions requiring professional or EIT registration as a prerequisite to membership. Those of us who have traveled the road from student to EIT and, finally, full registration within the influence of NSPE might tend to reject the nonregistered member as someone who has obtained status without sweat.

If numerous conditions are prevailed upon this new member, he, in turn, might find it more expedient to throw off these restrictions with the force of numbers rather than take the designed route of registration.

Are we to become another technical-social society resigned to removing ourselves into specialized groups designed to cultivate our own restrictive fields regardless of qualifications, or will we remain a coordinated group devoted to the progress of *all* engineers toward those political and ethical goals required for full professional recognition?

S. Eugene Easley, P.E.
Past NSPE Vice President
Indianapolis, Ind.

Dear Editor:

The NSPE Board of Directors at Seattle in July, 1961, further procrastinated on deciding once and for all that this is still the only truly *professional* organization for professional engineers.

Thousands of NSPE members without any compulsion of job requirements necessitating licensing as a P.E., for many years have paid their State and National dues because of personal beliefs in the obligation and need of a truly professional society of and for similarly thinking professional men only. Men who thought enough of such beliefs to espouse and maintain such an organization out of their own pockets.

Are these others who are not yet licensed P.E.'s just disinterested or what? Such excuses do not recommend them for NSPE membership. You first have to have a feel for the profession before you can be considered a "pro."

To my mind, no one has advanced one good reason to take in these sideline sitters on the proposed non-P.E. basis. Vaguely it is hinted that NSPE prestige with the resultant increased membership is a possibility. I would rather see NSPE membership decline, if by so doing we present a harder core of really active and *professional* members.

Let us remain a society of only P.E. members. Let the various technical societies more rapidly adopt stricter membership requirements which may require licensing. Despite our best intentions, once we admit nonprofessionals, we will be stuck with most of them for life and the meaning of this Society, for which the rest of us have fought over the years, will have vanished.

Frank L. Martin, P.E.
Alexandria, Va.

Dear Editor:

I have read with interest the article "Toward a More United Profession" which appeared in the June, 1961, issue of American Engineer. While reading the first five columns of the article, I kept thinking that NSPE is at long last beginning to recognize the problem which it faces in its highly commendable, but to date unsuccessful, purported attempt to represent the entire engineering profession. I must confess, however, that the remainder of the article was very disappointing, as I do not feel that the proposed plan is at all a satisfactory solution to this problem.

My objection to the proposed plan is that it still fails to recognize that there are, and will continue to be, many competent, professional engineers who (rightly or wrongly) are not registered. The proposed admission of nonregistered engineers is tied to the condition that some other engineering societies, over whom NSPE has and should have no control, eventually accept the NSPE criteria of registration as a prerequisite for membership. This, to me, is a "Khrushchev compromise"—completely one sided.

In your article you state that "the Functional Plan is based on the concept that every (professional) engineer should be a member of . . . his professional society. This is also a stated policy of NSPE." Later you comment on "NSPE's sincere desire to cooperate with all engineering societies in an all-out effort toward effective organization of the profession." Frankly, I do not believe that NSPE (of which I am a member) has any desire to represent all professional engineers. It wishes only to represent all registered engineers. The two terms "professional" and "registered" definitely are not synonymous . . .

George R. Town, P.E.
Dean, College of Engineering,
Iowa State University,
Ames, Iowa.

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(Circle 3 in Readers' Service Dept.)

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New Mexico SPE Acts on Payola Through Members

A prompt and professional response has come from the New Mexico Society of Professional Engineers, following disclosures of apparent engineering irregularities by the House Subcommittee on the Federal Highway Program headed by Representative Blatnik.

Five members of NMSPE were involved in the hearings. Of these, three were expelled from the Society, and two were completely exonerated of any ethical failings. NMSPE also recommended that the three who had violated the Code of Ethics be expelled from NSPE, and such expulsion will automatically follow NMSPE's action at state level.

Violations of Canons 8, 15, and 16 were cited as the reasons for expulsion, and each of the five involved was given a hearing before the NMSPE Committee on Ethical Practices. The Society's action is being forwarded to the New Mexico State Highway Department, and the State Board of Registration for Professional Engineers and Land Surveyors.

Expelled from the Society were E. L. Vick, R. J. MacDonald and L. E. Heathcock. In the cases of A. J. Gilbert and Marshall J. Wylie, it was found that there was no evidence of ethical violations and that no disciplinary action was warranted.

In a statement announcing the action, NMSPE made the following comments: "The Society, state and national, is a body actively engaged in promoting ethical practices among engineers. It is, therefore, not surprising that the remaining engineers (involved in the irregularities) were not members. . . .

"The Society and its members acknowledge that the majority of those employed by the Highway Department and contractors are honest and competent engineers. At the same time, the Congressional hearings brought forth evidence of misconduct in the Highway Department and among contractors. In order to protect the reputation of those deserving engineers, and to eliminate the underlying causes of this misconduct, it appears mandatory that the highway department and contractors undertake a thorough investigation of its personnel, organization and policies, and at once correct the administrative methods which allowed these cases to occur."

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NSPE Represented Among Patent Week Sponsors

"The American Patent System Week" will be observed during the week of October 15 in honor of the 125th anniversary of the Patent Act of 1836 which established the American Patent Incentive System.

The National Sponsoring Committee of leaders in science, technology and government, have asked the cooperation of national trade associations, chambers of commerce, and universities for instituting programs directed to the role of the American Patent System in their particular areas.

The National Society of Professional Engineers, as a group professionally engaged in the operation of the American Patent System, will be represented on the Sponsoring Committee by Executive Director Paul H. Robbins.

Groups Compile Paper on Engineering for Government

A joint coordinating committee of five engineering societies has issued a "Position Paper on Engineering for Government," which urges effective use of the total available reservoir of engineering manpower, including engineers in government and engineers in private enterprise. The position paper states eight points which the representatives of the organizations believe are sound guides. (See full text next page.)

The Joint Coordinating Committee is composed of representatives from the following societies: American Institute of Consulting Engineers; American Road Builders' Association, Engineering Division; American Society of Civil Engineers; Consulting Engineers Council; and National Society of Professional Engineers. Engineers Joint Council has an observer on the committee.

An earlier draft of the position paper was considered by the NSPE Board of Directors at the annual meeting in Seattle, Wash., last July when the following action was taken:

"NSPE believes that the objectives of the Position Paper of the Coordinating Committee on Relations of Engineers in Private Practice with Government are to establish a proper balance between governmental and private practice engineering in the public works field. The NSPE supports this objective as evidenced by several policy statements (NSPE Policies Nos. 33 and 63). The Board reaffirms these policies and commends them to state societies as a basis for state and local action to assure competent government public works engineering and a strong private practice segment of the engineering profession."

The NSPE policies referred to in the Board action are quoted in full below.

Policy 33—The Society expresses itself as being opposed to the nationalization of any professional services as economically unsound and detrimental to the public interest.

Legislation has been proposed for Federal programs involving professional services, with the attendant danger that such a program might result in the nationalization of the professional service involved.

It is our belief that nationalization of professional services will produce waste and will impair the quality of the professional service involved. We also believe that nationalization of professional services will result in a definite lowering of morale in the profession so affected and will destroy the intimate personal relationship and confidence which must exist between the professional practitioner and the patient or client, as the case may be.

Policy 63—NSPE advocates and supports the practice of high quality engineering services in both government and private practice, and maintains that engineering services should be under the direction of registered professional engineers. Professional engineers in government employ should perform the highest quality engineering services for preliminary study, preplanning and budgeting, and essential supervisory management and control of governmentally-funded activities. Governmental agencies should contract for engineering services with highly qualified private engineering consultants to the extent consistent with national security, proper continuity of governmental programs and the public interest. NSPE further reaffirms its traditionally stated position that engineers in government and private practice recognize a need for engineering activities of a complementary nature.

NSPE Member James Exum served as chairman of the committee.

Officially appointed committee members and their respective societies were: American Institute of Consulting Engineers—James P. Exum and R. H. Tatlow III, New York; American Road Builders' Association, Engineering Division—Maurice N. Quade, New York, and George B. Hills, Jacksonville; American Society of Civil Engineers—Mason G. Lockwood, Houston, and Gustav J. Requardt, Baltimore; Consulting Engineers Council—Hueston M. Smith, St. Louis, and C. E. Evanston, Chicago; National Society of Professional Engineers—L. M. Van Doren, Topeka, and Stanley A. Michael, Omaha. Mr. V. Weaver Smith of New York, was appointed as an observer by Engineers Joint Council.

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Position Paper on Engineering for Government

Adopted August 14, 1961, by Coordinating Committee on Relations of Engineers in Private Practice with Government

Introductory

The Coordinating Committee is a joint committee originally created by five professional engineering organizations of national scope. The purpose of the Committee is to coordinate efforts of the represented organizations in developing unassailable facts and sound policies for use of engineers and architects in private practice on public works financed by local, State, or National government.

The Committee was formally organized October 24, 1960. It is comprised of the following officially appointed representatives: American Institute of Consulting Engineers—James P. Exum, New York, N.Y., and R. H. Tatlow, III, New York, N.Y.; American Road Builders' Association, Engineering Division—Maurice N. Quade, New York, N.Y., and George B. Hills, Jacksonville, Fla.; American Society of Civil Engineers—Mason G. Lockwood, Houston, Tex., and Gustav J. Requardt, Baltimore, Md.; Consulting Engineers Council—Hueston M. Smith, St. Louis, Mo., and C. E. Evanson, Chicago, Ill.; National Society of Professional Engineers—L. M. Van Doren, Topeka, Kan., and Stanley A. Michael, Omaha, Neb. Mr. V. Weaver Smith, New York, N.Y., was appointed as an observer by Engineers Joint Council.

At its first meeting, the Committee directed a subcommittee to draft a position statement on engineering for government. A revised draft of the subcommittee statement was subsequently adopted unanimously by the Coordinating Committee.

Position Paper

Engineers in the employ of government, educational or other nonprofit institutions constitute a vital segment of the engineering manpower resources of the Nation. The balance of the engineering resources of the country is comprised of the equally vital pool of engineering employees and principals of private enterprise concerns. The latter group includes the human and other resources of firms in the private practice of engineering—traditionally, but now somewhat less aptly, called consulting engineers.

Under the American concept, the engineering needs of government historically have been obtained through combined utilization of publicly-employed engineering staffs and engineers in private enterprise, the services of the latter being procured through appropriate contracting procedures between government and professionally-qualified private concerns. There have been imperfections in the application of this well-established dual source of engineering for government; there are no imperfections in the theory. It has been the sheer lack of information or of simple understanding, rather than the imperfections of application that has somewhat disturbed the wholesome relationship between public and private engineers and their respective adherents. Recurrent criticism and discussion of engineering costs and practices on publicly-financed undertakings of local, state, and federal governments have clouded rather than clarified the basic issue on how the engineering needs of government can best be satisfied. Sharp differences based on unwarranted conclusions are inimical to both the public and professional interest.

The engineering needs of all levels of government have increased phenomenally during the past two decades. The outlook is for continued increase. These needs must be met by the effective use of the total available reservoir of engineering manpower consisting of engineers in government and engineers in private enterprise.

Based on the foregoing and other relevant considerations, the Coordinating Committee therefore resolves that:

(1) Private enterprise is the basic, traditional foundation of the American way of life and must be preserved and encouraged.

(2) Government should govern, not compete with its citizens.

(3) The following stated general policy of the Federal Government is a sound policy for government at any level: ". . . the Federal Government will not start or carry on any commercial-industrial activity to provide a service or product for its own use if such product or service can be procured from private enterprise through ordinary business channels."

(4) Engineering for government at all levels is best accomplished by the effective use of the professional skills and experiences of engineers both in private practice and in government service.

(5) Staffing of public agencies for engineering purposes beyond reasonable levels necessary to insure continuity, effective planning, administration, and control of public works projects is unwarranted.

(6) In the National interest, a healthy reservoir of engineering talent in all its branches must always be maintained so that in emergencies sufficient engineering manpower can be immediately organized to design and oversee construction of vitally essential military facilities and public works. Recent wars have demonstrated the inestimable value of the rapid availability of thousands of competent engineers in private practice.

(7) The expanding economy and technology of the Nation are dependent upon expansion of the many elements of private enterprise. Government policies should provide a healthy atmosphere for development, expansion and maintenance of private enterprise in engineering, in construction and in industry.

(8) Governmental agencies should contract for engineering services with highly-qualified engineers in private practice, consistent with the public interest, national security, and continuity of governmental programs and the requirements for quality, safety, over-all economy, and time-benefit relationships.

A NEW LOOK

at the Engineer in Industry . . .

The Engineer - in - Industry Committee of NSPE has taken a new look at **THE ENGINEER IN INDUSTRY IN THE 1960's** and discovered consistent professional advances:

- **He is less inclined to turn to unionism to achieve his aims.**
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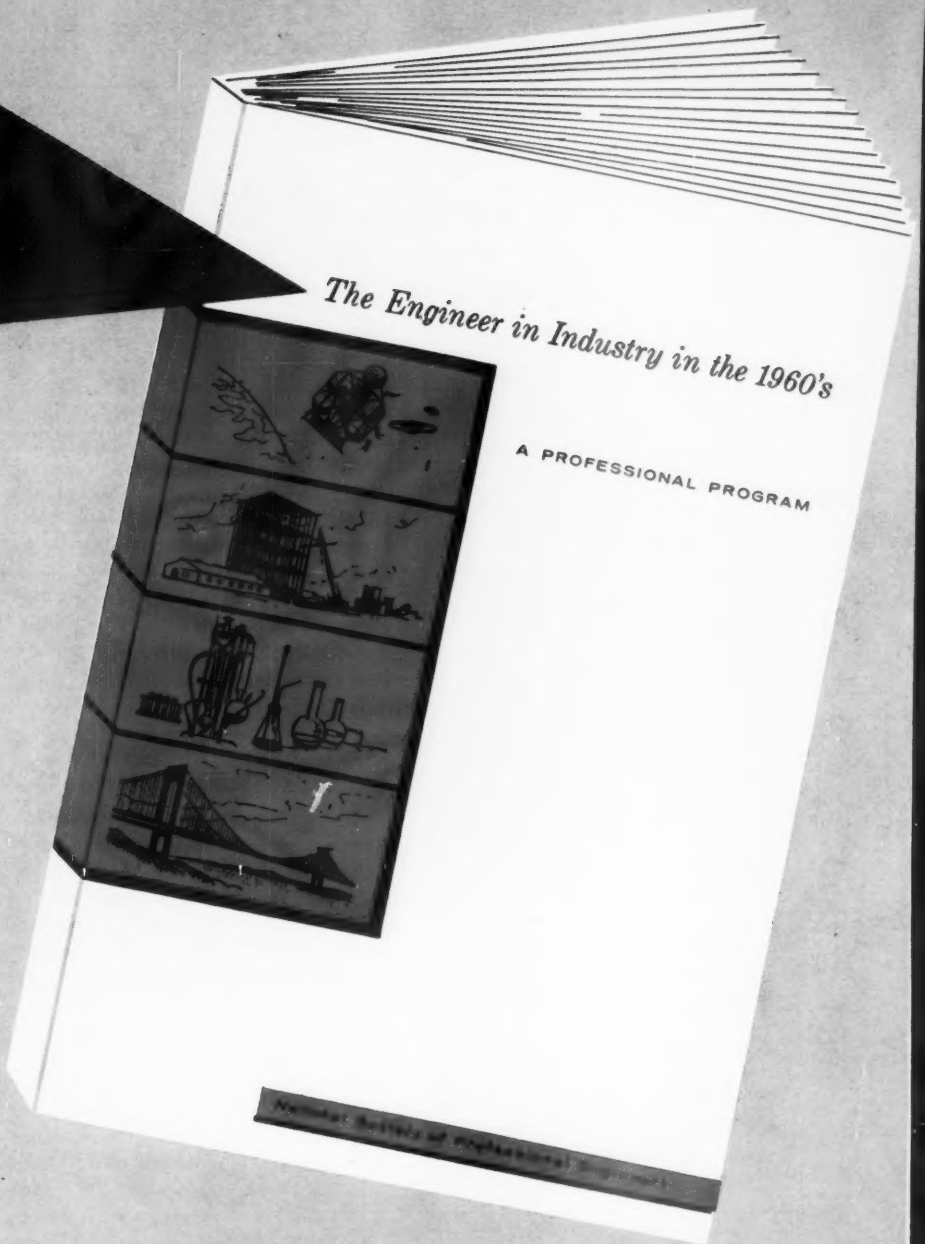
- **The "telescoping" of engineering salary ranges appears to have ended.**
- **Since 1956 salaries of experienced engineers have increased faster than starting salaries.**



Among the topics covered in the volume are: **Goals** of the individual engineer; National **labor policy** and how it affects the engineer in industry; the decline of engineering **unions**; sounding board organizations and **functional sections**; and engineering **management relations**. A vital section of the publication deals with **A PROFESSIONAL PROGRAM** describing methods for further improving the professional status of the engineer in industry. The detailed proposal for action set forth takes into consideration the joint responsibilities involved of management, the engineer and the professional society.

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Engineers Excluded from Union Vote by NLRB

The NLRB has recently excluded two groups of engineers from union representation elections among technical employees, and has declined to direct separate elections because the unions could not demonstrate a sufficient "showing of interest" among the professional groups.

In both cases, one at the E. D. Jones Corporation of Boston, and the other at the Bosch Arma Tele-Dynamics Division in Philadelphia, unions had sought to represent mixed units of professional and technical employees.

Both companies, however, objected to the inclusion of professional employees in the technical unit, and the Board agreed, excluding them from the voting unit. Normally, the Board would then direct a separate election among the professionals, but because the unions failed to produce authorization cards signed by at least 30 per cent of the engineers, the Board ruled the "showing of interest" was insufficient to justify a separate election.

At E. D. Jones Corporation, the American Federation of Technical Engineers had sought to represent six design engineers whom the Board excluded as professional employees, and 35 draftsmen subsequently included in the voting unit. At Tele-Dynamics, both the AFTE and the IUE had sought to represent about 90 technical employees, and in addition, the IUE wished to include 70 professional employees.

In ruling the six E. D. Jones design engineers to be professional employees, the Board noted that three had college degrees, one had a mechanical engineering certificate from a college in Scotland, and two had from 15 to 20 years experience in the fields. Subsequently, the draftsmen voted for union representation, 33 to two.

NSPE Policy Presented to House Subcommittee

In a statement to a House Armed Services Subcommittee, NSPE Executive Director Paul H. Robbins outlined the Society's views on the proper balance between Government staff and private practice engineering services for military projects.

The Special Investigations Subcommittee of the Armed Services Committee, has been examining the present military goods and services contracting procedures. Among the areas being considered is the use of consulting engineers, with the possible objective of establishing more appropriate and uniform policies.

In his statement, Robbins told the Subcommittee that NSPE had adopted policy statements reflecting the views of engineers in both private practice and Government service. He quoted NSPE Policy No. 63 regarding engineers in government, and emphasized that the public interest, health and safety deserved the highest quality professional engineering services available, in both the government and private practice.

To further aid the Subcommittee, Robbins recommended that the congressmen examine *The Role of the Consulting Engineer in Public Works Projects,* the fee survey report prepared by the Functional Section for Consulting Engineers in Private Practice.

Engineers Number High Among AEC Personnel

Engineers, scientists and supporting technical personnel make up about one-third of the 126,000 total employees of major Atomic Energy Commission contractors, reports the Bureau of Labor Statistics.

A survey of 1960 employment figures shows that the largest single occupation reported in the atomic energy field is that of mechanical engineer. Others ranking high were the electrical and electronics engineer, chemist, physicist, machinist, and machinery repairman.

Among the surveyed contractors, AEC-owned research and development facilities, operated by educational institutions and industrial concerns, accounted for about 34 per cent of total employment. Atomic energy facilities producing defense materials employed another 28 per cent. Other major areas of atomic energy employment included the design and manufacture of nuclear reactors, and the development of uranium for reactor fuel and for national defense purposes.

The survey covered an estimated two-thirds of all workers in the atomic energy field, with returns being received from 158 establishments operated by 130 major AEC contractors.

Survey Shows Graduates Decide Early About Jobs

The number of 1961 engineering graduates of ECPD-accredited schools who had made definite post-graduate plans by the middle of May reached a new high this year, according to a survey by Engineers Joint Council.

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(Circle 7 in Readers' Service Dept.)

graduates, 84.4 per cent had definite plans by mid-May, 61.9 per cent having accepted jobs and 12.5 per cent planning graduate studies. The highest previous total to have definite commitments by mid-May was 83.6 per cent in 1959, with 81.5 per cent of 1960 graduates being committed by that time.

The number definitely committed to jobs dropped somewhat from previous years, while the number planning graduate studies increased significantly, from 9.8 per cent in 1960 to 12.5 per cent this year. In addition, it was noted that a month later, by the middle of June, 14.3 per cent of graduating seniors reported graduate study plans.

In addition to those accepting jobs and going to graduate school, other graduates with definite plans included nine per cent entering the military, and one per cent specifying other plans.

Of those with no definite plans, 10.2 per cent were considering jobs, and 5.4 per cent reported no firm job offers or plans.

Recent Events Show Some Gains, Losses for Unions

The Association of Technical Engineers, Architects and Draftsmen, a local of the American Federation of Technical Engineers, AFL-CIO, has lost an election among draftsmen at the Groisser & Shlager Iron Works in Somerville, Mass., by a count of 15 to 15. Under Taft-Hartley, unions must establish a clear majority to win.

Previous to the election the company had contended that the union's election petition was inappropriate because the union had not polled its predominantly professional members to find whether they were willing to join with the company's nonprofessional draftsmen in the same union. The company also contended the single-employer unit of draftsmen would adversely affect its competitive position. The NLRB rejected both contentions, saying that the former was a misinterpretation of the separate choice guarantee for professional employees under the Taft-Hartley Act, and that the latter was not relevant to the determination of the proper voting unit.

At the Benrus Watch Company in Waterbury, Conn., a unit of technicians voted ten to nothing for AFTE. The union reports it will use this nucleus to expand membership in the area.

Within hours of the union's strike deadline, Lockheed Aircraft Corp. and the Engineers and Scientists Guild signed a new two-year contract. In a last minute compromise, the union dropped a demand for elimination of time clocks in the hourly group, along with other steps toward equal treatment for hourly and salaried employees, and cut wage and fringe benefit demands. The company withdrew its proposal to negotiate separate contracts for ESG's salaried and hourly membership, and agreed not to reduce the seniority factor in lay-off procedures. The agreement covers about 2400 engineers and 350 technicians at Lockheed's Burbank, Calif., installations.

Professionals in Oregon Given Separate Treatment

Under a new Oregon labor law, professional employees not engaged in interstate commerce will be entitled to the same separate treatment in collective bargaining as provided in the Taft-Hartley Act.

Making Oregon one of few states to provide separate treatment for professional employees, the new law carries a definition of "professional employee" which is identical to that in the Taft-Hartley Act. Alabama law prohibits professionals from being represented by a union which includes other than professional, executive, administrative and supervisory employees.

For purposes of collective bargaining, the Oregon law gives the State Labor-Management Relations Board authority to decide which units of employees are appropriate, but as in the Taft-Hartley Act, the board is not allowed to include professional and nonprofessional employees in the same unit unless the professionals vote for inclusion.

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Carnegie to Assist Planning Pakistan Engineering School

Carnegie Institute of Technology has been selected by the Government of Pakistan and the Ford Foundation to advise and aid in the establishment of two new technical universities in that country.

Dr. J. C. Warner, president of Carnegie Tech, said the program would begin immediately and announced the appointment of Dr. John J. Stewart, assistant dean of the College of Engineering and Science and associate professor of civil engineering, as consultant in residence in Pakistan.

The Government of Pakistan plans to establish two schools, one in Dacca in East Pakistan and one in Lahore in West Pakistan. A grant from the Ford Foundation will underwrite the consulting help given by Carnegie Tech.

The new technical universities will offer study in architecture, engineering, regional planning, and applied science. In East Pakistan, the university will be established through the expansion of the Ahsanuallah Engineering College; in West Pakistan, through the expansion of the engineering college now affiliated with the University of Punjab. The new universities will offer undergraduate and graduate education, conduct fundamental and developmental research, and provide advisory and research services to government and industry.

In East Pakistan, the first of the universities to get underway, a freshman class of 480 will be enrolled with a goal of 1700 degrees by 1970. East Pakistan Technical University will: (1) Undertake a program of teaching and research with a view to the development of natural resources and processes suitable for the special conditions of the country; (2) meet the growing demand for postgraduate education in architecture, engineering, regional planning, and applied science; and (3) increase the output of technical graduates in East Pakistan to meet the demand by the development programs in the fields of water control, power, industry, transportation, communications, and housing, which have been hampered by insufficient technical personnel.

Undergraduate teaching will be the major duty of the university in the next five years; postgraduate teaching will be introduced gradually as the staff and facilities become available. Initial research efforts will be directed towards the solution of current problems of importance to the country.

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6½% Increase Reported for College Faculty Pay

Average salaries for full-time faculty members in four-year undergraduate colleges rose to $7,330 in the current academic year 1960-61, up about 6.5 per cent from the $6,880 average of the previous year, the U.S. Office of Education announced recently.

Figures for the two years are not precisely comparable because not all of the 1,458 colleges and universities responding to the current survey had answered the 1959-60 questionnaire.

Institutions covered in the latest survey account for 91.6 per cent of the enrollment in public 4-year undergraduate institutions and 82.3 per cent of enrollment in private 4-year undergraduate institutions. Had every college in the country reported, averages for the United States as a whole might be somewhat lower than indicated, but the percentage change is probably the same, the Office of Education emphasized.

The Office of Education said that average salaries in four-year public undergraduate institutions of higher education is now $7,570, up 7.1 per cent from the 1959-60 figure. In private undergraduate institutions, it is $6,960, an increase of 5.5 per cent.

Average salary for nine or 10 month service in junior colleges and other 2-year institutions rose to $6,620, up 8.3 per cent from the $6,110 the previous academic year. This breaks down to an average of $7,000 in public 2-year institutions, compared with $6,560 the previous year and to $4,910 in private institutions, compared with $4,640.

The annual survey was conducted by Dr. W. Robert Bokelman, chief, Business Administration Section and Dr. Louis A. D'Amico, specialist for Business Administration, Division of Higher Education.

CSC Head Asks Cooperation at Meeting With Engineers

Members of the NSPE Functional Section for Engineers in Government Practice had an opportunity recently to meet with Chairman John W. Macy, Jr., of the U. S. Civil Service Commission, together with several of his key staff assistants, in order to discuss matters of mutual interest for strengthening the Federal service in meeting the need for high-quality engineering services appropriate to the missions of the Government. Chief among the topics covered during the hour and a half meeting were the following: (1) Professional review of classification and utilization actions to supplement and improve present administrative procedures; (2) government policies relating to professional organizations and employee unions; and (3) legislative and other developments for making government service more attractive to qualified engineers.

Considerable discussion centered around a means for improving Civil Service classification and utilization of engineers through increased professional participation in these actions. The Functional Section members offered the general thought that engineering employees as well as other professional groups could be of assistance in augmenting and supplementing the normal administrative reviews and evaluations. Chairman Macy and his staff readily agreed that the classification process is improved by involvement of key officials in the evaluation process. This is already done in two ways:

(1) Consultation by CSC with professional representatives of the agencies and with professional organizations when developing standards for each occupation. The Functional Section suggested that engineering advisory groups could be of assistance in resolving standards and other issues.

(2) Some agencies provide for classification by operators, with the aid of classifiers. One specific mechanism viewed with favor is the establishment of a "committee of peers" consisting of engineering or related professional personnel who can help evaluate the more complex aspects of various positions.

Chairman Macy indicated that the use of professional advice and counsel is already endorsed by the Commission and suggested that CSC might include queries on this point in their regular inspections of personnel operations in Federal agencies. He also said that members of his staff would give some thought to developing an article on this subject for publication in civil service journals.

Reference to Federal employee-management policies was highlighted by a discussion of President Kennedy's recent appointment of a high level executive task force to study all ramifications of this problem. CSC Chairman Macy, a task force member, indicated that the study group would solicit the views of interested organizations and individuals prior to submitting its findings and recommendations to the President by November 30. He also said that the views of NSPE on governmental relationships with employee organizations would be welcomed by the task force and that the Society would be notified when hearings are scheduled.

Macy acknowledged the recurring seriousness of the Government's competitive disadvantage in the salary field, but indicated that he did not think a separate classification schedule for engineers would completely resolve the situation. He also said that such a system could create internal personnel and budgetary problems. Instead, the Commission would prefer a complete revision to the present Classification Act in order to inject a greater degree of overall flexibility in the setting of Federal salaries. He reported that the Commission and the Bureau of the Budget, as well as the Federal Council on Science and Technology, have several alternate proposals currently under study.

"Yes sir, team work! That's what I like to see. Probably trying to find the solution to a tough problem by working together."

Bill to Permit Two-Step Promotion Passes House

A bill to provide for a minimum two-step salary increase on promotion instead of the present minimum one-step increase has been passed by the House and referred to the Senate. Under present law, promotion is accompanied by a minimum of a one-step increase, but the formula is applied only to the scheduled rates of the grade to which promoted, and not to any of the three higher longevity rates. Consequently, employees who are already at the top longevity rates of some of the grades receive only a token increase when promoted.

The bill would change basic law

in two respects: First, the amount of the minimum increase will be doubled from the present $105 for grades GS-1 through GS-4; $165 for grades GS-5 through GS-10; and $260 for grades GS-11 and above, with the exception of GS-15. Second, the legislation will remove the present maximum scheduled rate limitation and will permit promoted employees to be placed in any of the three higher longevity rates, if necessary, in order to receive the full benefit of the guaranteed minimum increase. (H.R. 1010)

During House floor debate, Rep. Lesinski of Michigan, a ranking member of the Civil Service Committee, said that "to expect an employee to take on heavier responsibilities and more difficult duties without a reasonably comparable increase in pay certainly would lessen the incentive of the most devoted of us to accept those greater responsibilities. It certainly is not a policy conducive to an efficient or economical Federal service."

Per Diem Rate Raised for Federal Employee Travel

Federal employees traveling on official business may now receive a maximum per diem allowance of $16 in place of the former $12. The increase was signed into law by the President on August 14, 1961 (P.L. 87-139). The new law also increases the maximum mileage allowance from 10 to 12 cents per mile when privately owned automobiles are used. A new feature permits employees to be reimbursed for parking fees incurred while in official travel status.

When asked to comment on the increase, the General Accounting Office agreed that sufficient justification exists for increasing the statutory per diem allowance to $16. The GAO added, however, that the maximum $16 allowance should be adequate for higher cost areas "and that agencies will fix a lower allowance for areas where experience shows that the costs of subsistence are somewhat lower." In its report on the bill the Senate Civil Service Committee stressed that the $16 is a maximum rate to be allowed by the departments and agencies only when the circumstances clearly warrant. The Committee suggested such possible economies as better scheduling of work and appointments, the acceptance of coach accommodations on trains and planes when perfectly suitable to the occasion, "and other measures taken as a matter of course by a prudent private traveler."

Meanwhile, the House Armed Services Committee has approved a bill to raise the per diem rate for members of the uniformed services from $12 to $16 in order to bring them in line with the new civilian rates. The bill does not propose an increase in existing mileage allowances, however. (H.R. 7723)

Kennedy Orders Review of Outside R & D Projects

Following Congressional criticism of Federal practices in contracting out research and development activities to so-called "sidebar" corporations, President Kennedy has directed the Budget Bureau to review the effectiveness of this means of accomplishing the Government's purposes. The President's request to Budget Director Bell has been interpreted as a move to reduce the amount of research and development work now farmed out under contract, and to have the Government take over more of this activity.

The President said that while the use of contracts with private corporations is essential and appropriate to carry on certain types of Federal operations, "it also appears that use of the contract device has been made necessary in part by the limitations which exist with respect to direct Federal operations."

In an apparent move to correct some of the "limitations," the President directed Bell to consider Federal policies for controlling the salaries and fringe benefits of personnel working under such contracts. He also asked that the review consider the criteria to be used in determining whether to perform a service or function through a contractor or through direct Federal operations, the policies which should apply in selecting contractors, the means for reviewing and supervising contractor operations, and the policies which should apply with respect to contractor fees and cost reimbursement items such as overhead, facilities and equipment and advertising.

The proposed study will cover contracts dealing with the operation and management of research and development facilities and programs, analytical studies and advisory services, and technical supervision of weapons systems and other programs administered on a systems basis.

The President said that the use of such contracts for the past decade or so has been made necessary by the Government's entry into new fields, such as atomic energy, missile development and space exploration, and the need for talents and services not previously employed. "In part," he said, "the use of contracts has also been induced by the recommendations of the second Hoover Commission and other groups that the Government terminate activities which could better be performed for it by private enterprise."

President Kennedy has asked that the results of the Budget Bureau's review and study be available not later than December 1, 1961.

Meetings of Note

Engineers Council for Professional Development—Annual Meeting, October 2-3, Louisville, Kentucky.

American Standards Association—National Conference on Standards, October 10-12, Rice Hotel, Houston, Texas.

American Society of Civil Engineers—New York Annual Convention, October 16-20, Hotel Statler, New York, New York.

American Institute of Consulting Engineers—Annual Dinner, October 17, New York, New York.

American Institute of Mining, Metallurgical and Petroleum Engineers—Annual Meeting, November 2-3, Los Angeles, California.

Society of Naval Architects and Marine Engineers—Annual Meeting, November 15-18, Waldorf Astoria Hotel, New York, New York.

American Society of Mechanical Engineers—Winter Annual Meeting, November 26-December 1, Statler Hilton Hotel, New York, N.Y.

Strictly Business

Personalities . . . **Harry Czyzewski,** president of **Metallurgical Engineers, Inc.,** has been appointed a member of the **Oregon State Board of Engineering Examiners** by Governor Mark O. Hatfield . . . Management Consulting Division of **Ebasco Services Inc.** has named **Hermann F. Bottcher** as director of Manufacturing and Operations Services . . . **R. L. Dyer** has been appointed general manager of **Smith Thermotronics** of Conshohocken, Pa. . . . **Marvin R. Emerson** has joined **MS&A** as a computer consultant in Hawthorne, Calif. . . . **Arthur E. Humphrey,** associate professor of chemical engineering at the **University of Pennsylvania** has been appointed director of the School of Chemical Engineering . . . **The University of Missouri** has named **Dr. Joseph C. Hogan** as acting dean of the University College of Engineering and acting director of the Engineering Experiment Station . . . **Willard J. La Morte** has been elected president of **Shattuck Denn Mining Corp.** . . . **General Kinetics Corporation** has appointed **Thomas M. Goike** as chief engineer . . . **C. Howard Leaf** has been appointed marketing director for military products for the **General Products Corp.** . . . **J. P. Barger,** president of **Dynatech Corp.,** has announced the appointment of **Richard L. Mela** as manager.

Mr. Czyzewski

David C. Liu has recently joined the partnership of **Dames & Moore** of Los Angeles, Calif. . . . **John J. Moran** has been elected as executive vice president of **Sigma Instruments, Inc.** . . . **Justin Neuhoff** has been appointed manager-engineering for **General Electric's High Voltage Switchgear Department,** Philadelphia, Pa. . . . **Humble Oil & Refining Company** has named **Henry F. Dreyer** as manager of railroad sales of the Esso Standard Region . . . **Evans Taylor** was recently honored for completing 25 years of service with **The Electric Storage Battery Company** . . . **Thomas R. Keene** and **Donald T. MacRae** have announced the establishment of their partnership to be now **Keene/MacRae Associates** . . . The appointment of **William A. Russell** as vice president, marketing for **Miniature Precision Bearings, Inc.,** was announced recently by Horace D. Gilbert, president . . . **Raymond J. Slomski** has been appointed to the engineering staff of the Automatic Controls Division, **Electro Nuclear Systems Corp.** . . . **Geoscience Instruments** has elected **Professor Rhodes W. Fairbridge** to its board of directors . . . **John D. Bloom** has been appointed manager of marketing for **Leach Corporation** of Los Angeles, Calif. . . . **Arthur L. Adamson** has resigned as chairman of the board of **Electronic Associates, Inc.**

Mr. Liu

Paul Gottfried has joined **Booz, Allen Applied Research, Inc.,** as a reliability scientist in Washington, D. C. . . . **Polarad Electronics Corp.** of Long Island, N. Y., has announced the appointment of **Herbert W. Pollack** to engineering manager . . . **Fred L. Martinson** has been appointed vice president of the engineering and manufacturing division of **Electronic Associates, Inc.** . . . **J. J. Davis** has been elected president of **Esco Corporation** of Portland, Ore. . . . **Keuffel & Esser Company** has appointed **Eric F. Burtis** as market manager of Audio-Visual . . . **Norman L. Meyerson** has been appointed director, experimental research at the Harrison Division of **Worthington Corp.** . . . The appointment of **R. E. Whiffen** as general manager of Bendix Products-Aircraft division was announced recently by A. C. Omberg of the **Bendix Corp.** . . . **George W. Soete** of Princeton, N. J., has been appointed chief engineer, Centrifugal Pumps at the Harrison Division of **Worthington Corporation** . . . **Robert W. Gray, Inc.,** Wellesley, Mass., has announced the appointment of **Arthur Gray** as vice president in charge of sales . . . **Dr. Nathan W. Snyder** has joined **Royal Research Corp.,** Hayward, Calif., as vice president and director of research and engineering.

Mr. Gottfried

George V. Gerber has been appointed chief components engineer of the **Daystrom, Inc.,** Military Electronics Division . . . **Philip S. Hill** has been named president of the **Hyster Company,** Portland, Ore. . . . **R. F. Sharon,** vice president of the Bettcher Manufacturing Corp., has been elected chairman of the Infra-Red Gas-Fired Radiant Heater Group of the **Gas Appliance Manufacturers Association** . . . Appointment of **Richard J. Ashman** as customer equipment engineer was announced recently by Dan G. Sully, president, **Moore Associates, Inc.,** San Carlos, Calif. . . . **Fabricon Products** has named **John T. Watkins** as vice president and general manager of the West Coast Operations . . . **C. R. Possell** has been appointed chief engineer of the **Assembly Engineers, Inc.,** Los Angeles . . . **Union Carbide Plastics Company** has named **John R. Peterson** as office manager of the Cleveland District Sales Office . . . Appointment of **Dr. Scott C. Daubin** as head of the marine sciences section of the Sea Operations Department of the **General Motors Defense Systems Division** was announced recently by Harold R. Boyer, vice president . . . **Orville R. Mertz** has been elected a member of the board of directors of **Koehring Company,** Milwaukee, Wisc.

Mr. Gerber

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Aid for Engineers in School:

The Million-Dollar Money Tree

By
FRED HAMLIN
American Engineer Staff Writer

THERE are three convenient yardsticks with which the amount of money being given away in the form of scholarships, fellowships and other educational grants:

Areas being covered—From folklore to pharmaceuticals, from ceramics to cereal technology, there is practically no imaginable field that is not covered.

Points of saturation—There are rumblings on some campuses which, loosely rendered, sound like, "Stop, you're crippling us with kindness."

Unclaimed excess—Each year, some amount of the available money that is handled out goes unclaimed.

Regardless of the yardstick that is used, and there are others equally accurate and more detailed, the invariable conclusion is that a deep, deep well of cash is being measured, and there are few indications that the well is going to run dry. In point of fact, fellowships, scholarships and grants provide the colleges and universities in the United States with a multi-million dollar source of funds—without them, the national educational picture would be different indeed.

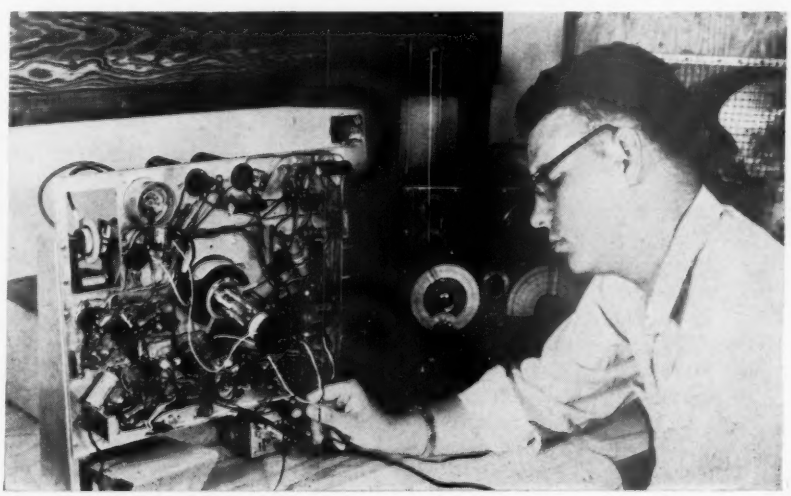
Within this multi-million dollar complex of money for study and research, science and engineering claim, receive and expend by far the largest amount. One example: Under the National Defense Education Act, in the single category of graduate fellowships, engineering alone accounts for approximately half a million dollars, used at schools scattered all over the Nation.

The Ford Foundation, the Rockefeller Foundation, Gulf Oil, General Electric, Westinghouse, Proctor & Gamble, Sears-Roebuck, and the Guggenheim Foundation are only a few of the many industrial and philanthropic organizations that provide substantial sums each year, going in part, often in large part to the engineering profession through engineering schools and students.

Most significant, and in the long run most productive, are the many post-graduate and post-doctorate fellowships and grants that are awarded each year. Some of these, such as those covered under the National Defense Education Act, are directed to very specific goals. NDEA aims primarily to increase the supply of able and well trained teachers.

There are many others which aim solely to promote more and better research in the fields of

A tremendous range of opportunities for financial support are available to the engineering student, regardless of his field, and regardless of the school he happens to be attending. (Photo: Office of Education, HEW)



Chemistry and chemical engineering represent one of the most heavily endowed areas under fellowship programs. The main reason is generous industrial participation in this area. (Photo: George Washington University)

Both as graduate and undergraduate, ample funds are available to the engineer who needs help. For the more complicated graduate projects, money is often available for equipment necessary to the student's work. (Photo: Office of Education, HEW)

engineering. A valuable source for finding what's available in the way of this type of grant is published by the Association of American Colleges. "Fellowships in the Arts and Sciences," is available through AAC. A sampling gives some indication of what is available.

Take for instance the Radio Corporation of American Fellowships which cover physics, electrical engineering, engineering physics and electronics. The stated aim of these programs is a broad one: "To encourage and provide financial assistance in the schooling of new scientific personnel for the growing requirements and wider horizons of the electronic age. . . ." The 21 awards in these and other areas each carry a $2100 stipend, plus tuition for an academic year.

Or take the more specific Daniel and Florence Guggenheim Fellowships in jet propulsion and flight structures, available to engineering graduates interested in basic research and eventual leadership in the future development of rockets, jet propulsion, flight structures and the space flight sciences. Participating schools include Columbia University, California Institute of Technology and Princeton. There are up to eight fellowships available at each of these schools.

At the pre-doctoral level, a quick rundown shows fellowships available in the following areas of engineering: Engineering science, electronics, electrical engineering, industrial engineering, civil engineering, applied mechanics, mining engineering, mechanical engineering, chemical engineering, nuclear engineering, aeronautical engineering, geological engineering, agricultural engineering and petroleum engineering.

In short, there is some form of aid available to just about any engineering student in the Nation, provided he has the ability to qualify and the desire to go into graduate work. Further, there is a heavy probability that some sort of fellowship exists at the school of his own preference; it would be difficult indeed to find a school not covered under some form of aid and assistance.

Not surprisingly, one of the largest programs of fellowships and grants is sponsored by various agencies of the Federal Government. Through the National Defense Education Act, National Science Foundation, Atomic Energy Commission and a number of other agencies, the Federal Government does a great deal each year to promote research and graduate study throughout the Nation's institutions of higher learning.

National Science Foundation serves as a fairly good example of the way in which government agencies administer their grants. NSF aims its funds at a great number of scientific areas, ranging from mathematics to sociology. In this spectrum, engineering plays a significant part. It is worth noting however, that at least one NSF source feels that more engineering work could—and should—be supported under the NSF aegis. In essence, his comment was, "Perhaps the word 'science' frightens them away, but we would certainly be happy to handle more of this sort of work."

The qualifications for a National Science Foundation Grant are that the applicant "has demonstrated ability and special aptitude for advanced training . . . leading to a master's or doctoral degree." He must further be a U. S. citizen. His application is sent directly to NSF, and is reviewed by a panel of scientists from NSF and the National Academy of Sciences. Final selection is made by NSF. The criteria for selection are broad: High scholastic standing and potential for a productive career in engineering.

But the award, when it is made, is well worth the competition to the recipient. For the engineer

with a wife and one child, the stipend for the first year is $2800, and this progresses to $3200 during the third year of work. Further, full tutition and fees are paid, along with a limited travel allowance. From the standpoint of the research that is being done, it is also important to note that NSF provides a special allowance for the purchase of special equipment or for unusual research expenses.

Fellowships and grants under the National Defense Education Act are handed a bit differently. In this case, the initiating party is the school itself. It will submit to the Office of Education under the Department of Health, Education and Welfare a proposal, requiring, for example, four fellows to handle a specific research project. If the project is approved by HEW, selection of the fellows is made by the university. Although there is a final approval of selectees within HEW, none has ever been rejected at that level.

The fellow under this program receives a stipend of from $2000 to $2400, plus dependent's allowance. Further, the institution which handles all administration involved receives a grant of up to $2500. For the academic year 1960-61, 1500 fellowships were awarded under this program, of which nearly 400 were engineers. One curious sidelight regarding the NDEA program: None of this money is going to the Massachusetts Institute of Technology. Discrimination? No, MIT simply has enough grants from other sources to handle its present needs.

In a way, the mushrooming mound of money available to the Nation's universities has been a real boon. Probably never before in history have so many schools been able to support such a high level of post-graduate education and research. The result has been more and better highly educated engineers available to education, industry, and of course for further research. For the profession itself it has meant a growing influx of highly trained young engineers, and the indirect plowback dividend from those graduate students who teach after completing their studies.

But there are few programs of the magnitude of this one that have no faults whatsoever. This one is no exception. While the multitude of fellowships and grants are unquestionably building a stronger base for the profession in one sense, there is another side of the question which, in the long run, could create a real problem.

In a recent issue of the *Journal of Engineering Education,* one professor was quoted as commenting, "Never did I think that in my old age I would become a business man." Said another, hardly less resigned to his fate, "It wouldn't be so bad if the calls from Washington wouldn't get me at home before breakfast."

A hypothetical situation cited in the same issue of the *Journal* outlines some of the problems that can arise for the faculty member whose prime job is teaching theoretically. If this is a bit extreme, it is nonetheless indicative of the problems that exist for many engineering professors.

". . . Professor Y operates on a large scale, and is currently the darling of many university administrations. He has a number of contracts (mainly from government agencies), maintains a research laboratory with at least one full time expert mechanic, has three students engaged in doctoral research and five or six lower level graduate students employed as helpers. Other staff members, colleagues of Professor Y, may also have part time assignments with the group. . . .

"Professor Y faces the pressures of big business. The university cannot afford to give financial guarantees to Professor Y to assure the continuance of his operation in the event of loss of his contracts. Since it is at best very difficult, and possibly unethical, to cancel the employment of students and staff when funds run out, not to speak of the problem of hiring and firing of the needed expert mechanics, the pressure on Professor Y to obtain contract renewals or replacements is very great. He will try to get contracts for the research of primary interest, but he soon begins to settle for less. There comes a time when he will take any work, including routine industrial testing, to keep his laboratory doors open."

Is the man in this position a professor or a corporate officer? It would be a difficult question to answer. Assuming that his research goes well, that his contracts are all renewed according to plans and schedule, what then? There is at least a chance that a legitimate love of research, coupled with the extra money that can be involved will lure him away from his primary job, which is teaching.

The base salary of the instructor or professor has never been among the highest in the Nation.

The engineering professor, as well as his students, can often qualify for research grants. These not only further the engineering technology in general, but serve to keep the professor abreast of his field. (Photo: Office of Education, HEW)

If, by working with research grants and contracts available within his field, he can add a bit to his salary, stay current in his field of technology, and still handle his teaching chores, there can be no complaint. To the degree that this sort of professional "moonlighting" keeps the professor in contact with the latest developments in his field it is all to the advantage of the profession.

As quoted in a recent interview, Princeton President Robert F. Goheen has cited a marked and dangerous trend. Just at the time when there seems to be a shortage of teacher-scholars, he finds some of the ablest men are being drawn completely away from undergraduate education. This promises nothing but bad consequences, in his opinion.

Satistically, it looks this way: During the 1957-58 academic year, the number of university scientists and engineers engaged full-time in research totaled 30,000, or 12 per cent of the total professional staffs at U. S. colleges and universities. Only two years later, this figure had climbed to 40,000 or 15 per cent of the staffs. For 1970, the National Science Foundation projection is that 80,000, or 20 per cent of the staffs, will be handling full-time research work.

There is, of course, a rather thin line to be drawn. It is impossible to imagine effective graduate training of engineers without a good deal of time, effort and money being spent on research. On the other hand, it could conceivably be a bit clumsy if the research cart gets too much out of line with the education horse.

There appears to be a fairly clear trend, but whether or not this trend is of necessity a harmful one is still open to question. The words of Carl F. Floe, vice president for academic research at MIT, probably offer a fair statement of the present situation: "I don't think we've seen the top by any means. MIT now devotes 40 per cent of its academic budget—the budget for the campus proper—to research. . . ." But this does not lead to a categorical answer on whether teaching will be hurt in the years ahead. Says Floe, "The faculty will have to watch it."

Actually, the problem here is not in the least bit unusual. Simply stated, it is that millions of dollars have been made available to the colleges and universities in the Nation, and this money has made a good sized splash. To absorb such staggering dollar-volumes the various schools have had to make a few adjustments in their traditional methods of doing business. The only "problem" is that the schools should lose sight of their original purposes. Given the long traditions of academic freedom and independence, it is unlikely that any real side-tracking will take place.

In the meantime, the engineering student in need of financial aid has never had it so good. There can be literally no reason for the outstanding engineering student to have to leave his studies for lack of money.

Appropriately, this is particularly true for the graduate student. It is at the graduate level where the best talents are most highly developed in students, and to do this the heaviest investment is needed. One sample, reported in *Journal of Engineering Education*, indicates that the cost of an "equivalent master's degree" is about $10,000. The equivalent master's is a computation of all graduate degrees, allowing three years average study for a Ph.D., and one for a master's. Thus, a Ph.D. is roughly equal to three masters' degrees.

The reason for this high cost to both institution and student is clear—better equipment, more intensive study, and the need for a higher level of instructions are all necessary for top level graduate work. In this context, it is well and necessary that the amount of money made available should maintain a high level, and perhaps increase.

The simplest measure of how well this money is being spent is available in the statistics on graduate degrees being conferred in engineering. Over the past few years, they have steadily increased, and there is every reason to believe that this trend will continue in the future. Further, the increased amount of research that is being made possible serves to benefit the entire profession from a technical standpoint, while at the same time enabling engineering schools throughout the nation to turn out a more competent, better trained graduate at the bachelor's level.

Basically, the millions of dollars that are being given to engineering schools represent an investment in intangibles. But it is eminently clear that these are the very intangibles which, in the long run, will build a stronger profession, a profession that is always able to push at the edges of its present knowledge, and as a result, grow for the future.—**End.**

With the price tag for a master's degree estimated at $10,000, it is clear that some form of support is necessary for the engineering student. In the long run, this support represents an investment for the profession. (Photo: George Washington University)

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

Summary of the Session ►

The First Session of the 87th Congress is nearing the finish wire and the legislators will be back at the "grass roots" or on foreign inspection and study trips (sometimes called "junkets") when this report is received. At the close of the session, expected around the end of September, there will be the usual summing up from two different points of view—Administration leaders will claim a notable record of significant achievements and the opposition leaders will claim that the New Frontier was a dismal failure. As usual, the truth lies somewhere between the two poles. In domestic affairs, the Administration's chief disappointment was the failure to achieve its high priority target of general aid to education, both in terms of elementary and secondary school construction and teachers' salaries, and aid to colleges for the construction of academic facilities and scholarships. At this writing, it appears that Congress will complete action on an extension of Federal funds for impacted areas and a two-year extension of the National Defense Education Act, without amendments. The latter action will probably foreclose consideration of any further aid to education legislation in the 1962 session, an election year. This development has the unfortunate effect of denying desirable action on some aspects of the original proposals about which there was little controversy, such as forgiving up to 50 per cent of student loans for teaching at the college level (now permitted only for teaching at the elementary and secondary schools) and financial assistance for college academic facilities.

◄ ***Support for Shelter Program***

The Berlin crisis has given the fallout shelter program a new shot in the arm. Congress has earmarked more than $200 million for a crash program to survey and identify existing adequate shelter space. The Defense Department estimates that fallout shelter space for 20 to 30 million Americans will be ready for use by December 1. The goal is to have shelter space for 50 million citizens by the end of 1962, marked and equipped with emergency water, food and medical supplies. All of the space will be in basements, hallways and other areas of existing large public and private buildings. The present program does not provide for financial aid in the construction of shelters. Before the congressional action was completed an intensive four-week training program for some 100 Army and Navy engineers had commenced. The engineers, mostly civilian employees, were taught what to look for in designating areas as fallout shelters. The Defense Department hopes to have the engineering graduates of the course operating within a few weeks, supervising surveys to be conducted by engineering and architectural firms. Local engineers and architects selected by the Army and Navy personnel will receive two weeks' training at Fort Belvoir, Virginia, and other regional centers. The Office of Civil and Defense Mobilization has available the publication, "Fallout Shelter Surveys: Guide for Architects and Engineers." Copies of the 52-page pamphlet, covering shielding fundamentals and calculations, space and ventilation, water supply and sanitation, power supply and other factors are available without charge from OCDM, 50 North Washington Avenue, Battle Creek, Michigan.

Compromise on Conversion ►

Another compromise solution to a hard fought congressional battle was eliminated in the saline water program of the requested authority to make loans and grants to communities to spur building of conversion plants. It was feared that this step would put the Federal Government into the municipal water supply business. With the resolution of this sticky point, Congress has approved a ten-year program to expand the Government drive to convert sea and brackish water into fresh and pure water. It was brought out in the debates that water consumption in the U.S. had increased from an estimated total of 40 billion gallons daily in 1900 to 312 billion gallons at the present time. Consumption during the next fifteen years is expected to reach 435 billion gallons daily. The Senate Committee on Interior and Insular Affairs reported that ten years ago the lowest cost was about $4 for 1,000 gallons of fresh water. Now, the committee said, some plants can do the job for $2 a thousand. At Freeport, Texas, where the first conversion plant was installed earlier this year, the cost has dropped to $1 a thousand, the committee added. Plants are being built at San Diego; Webster, S.D.; Roswell, N.M.; and Wrightsville Beach, N.C. Under the pending program another plant is in prospect for Vernon Springs, Utah. Other sites are yet to be announced.

◄ Power Plant Impasse

The Senate has approved a compromise provision in the Atomic Energy Commission appropriation bill which will provide funds for one reactor plant at Hanford, Washington. Earlier, the Senate had approved some $95 million for converting the reactor under construction at Hanford into the world's largest atomic power plant. The plan to use waste heat from the plutonium-producing reactor through the addition of two generators was killed in the House after a bitter fight between the public power and private power blocs. Under the original plan, 800,000 kilowatts to be produced by the reactor would have been delivered to the Bonneville Power Administration for sale. The compromise will provide funds to permit the production of 400,000 kilowatts of electricity for Bonneville that the AEC Hanford installation would have to get otherwise from the Bonneville system. Opponents of the plan argue that it will still put the AEC into the business of selling power by providing Bonneville with additional power to sell because it would be relieved of its present obligation to deliver power to the reactors. If the House refuses to go along with the compromise, public power advocates may try to withhold more than $100 million in Federal grants to private utilities that are building atomic power plants.

Revising the Copyright ►

Next year Congress will undertake a study of basic revision of the U.S. copyright laws. A report by the Register of Copyrights will be the basis of the study and the complete report has been published by the House Committee on the Judiciary. Copies are available from the Superintendent of Documents, Washington 25, D.C., at 45 cents. Two points of possible interest to consulting engineers and architects pertain to the extent to which architectural drawings are or should be copyrightable and the extent to which photocopying of copyrighted material should be permitted for research use.

◄ Science Foundation Fellowships

Applications are now being accepted by the National Science Foundation for two graduate-level fellowship programs: Cooperative Graduate Fellowships for the academic year 1962-63, and Summer Fellowships for Graduate Teaching Assistants for the summer of 1962. Applications must be submitted by November 1, 1961, and December 8, 1961, respectively. The fellowships include work in engineering, mathematics, physics and other scientific fields. For application forms and other information write the Fellowships Section, Division of Scientific Personnel and Education, NSF, Washington 25, D. C.

Education

for the Engineer and the Scientist

By
ROY A. NYQUIST, P.E.

Director of Engineering
Libby-Owens-Ford Glass Company
Toledo, Ohio

THE assignment given me in this article is quite broad: What does industry expect or desire of the engineer and scientist to meet the challenging requirements of the decade? An *ideal*, answer to industry's requirements can be briefly summarized as follows:

- Be a highly trained specialist in his chosen branch of engineering or science, and yet be proficient in other fields of engineering and science.
- Be able to speak fluently and compose technical reports of unmistakable clarity and brevity, easily understood by management, by his associates regardless of their educational specialty, and by the man on the street.
- Have at least a good working knowledge of one foreign language other than English. Those possessed with courage and determination should study and master Russian.
- To soften the impact of shortage of his numbers, be thoroughly familiar with and able to operate the most complicated and awe-inspiring analog and digital computers; be able to establish the equations to be solved and interpret the solutions obtained.
- Be a team player with the desirable faculty of being able to explore the clouds, yet maintaining both feet solidly on terra firma. Be a dreamer, but blessed with common sense.
- Possess a top notch sales personality able to make friends easily, inspire confidence of management, win friendship and cooperation of his immediate associates, and gain respect of labor personnel he must contact to implement his ideas. He should be able to successfully complete t r o u b l e shooting assignments with irritated customers, not only to satisfy these customers, but to pave the way for repeat orders.
- Be blessed with an understanding wife who recognizes the need for his traveling often and sometimes to distant lands in the course of his professional duties.
- Be active and "influential" in the technical and professional societies; if eligible, be a registered professional engineer or architect, sincerely interested in promoting a spirit of true professionalism. Be willing to encourage other young men and women to become interested in pursuing careers in engineering and science.
- Having all the aforementioned very desirable attributes, be willing to accept less than the astronomical salaries resulting from intense competition for technical personnel, particularly from those industries blessed or burdened with "cost plus" defense contracts.

Such an ideally qualified engineer or scientist probably does not exist. The challenge confronting engineers and scientists during this decade is three-fold: To keep industry abreast of the unprecedented population boom; to keep pace with the tremendous technological advance which has occurred since World War II and which is accelerating at an unbelievable rate; and to meet the challenge of low cost products being imported from Europe, Asia, and South America—areas of comparatively low labor costs.

My objective here is to emphasize the need for training *more* qualified engineers and scientists —not a "crash" program inspired by Russia's recent technical exploits and their reported large number of engineers and technicians available or being trained.

but a long range program designed to meet these challenges.

THE first important reason why industry will require more and better engineers will be to keep abreast of the unprecedented and exploding population growth—212,000,000 people in 1970 compared to 180,000,000 today. Since World War II, we have added more people to the Nation than were added during the entire period 1920 to 1945, and this upward trend in births does not seem to be leveling off. Some 4,280,000 babies were born in 1959 and it is predicted that by 1970 the annual birth rate will have increased to over 5,500,000. During the next ten years we will add to our population more people than are now living west of the Mississippi. The impact of this increasing population on the economy of our country can be fully realized by consideration of the following data published by American-Marietta Company in an economic report entitled "The Years Ahead."

(1) Rise in number of school age children will require expenditures upwards of ten billion dollars during the next ten years for elementary and secondary schools. Considerable expenditures also will be required for additional classrooms, and laboratories for our colleges and universities, and for higher salaries to retain and attract competent people and maintain high standards of instruction.

(2) The number of young adults, age 18 to 24, will increase over 50 per cent. This age group spends 27 per cent more than the national average for automobiles and a huge 75 per cent more for furniture and television.

(3) Nearly 18 million more houses will be required.

(4) To accommodate the prevailing move to the suburbs, a hundred thousand more shopping centers will be needed.

(5) New industrial plants and equipment will be needed. During the past ten years industry has poured 290 billion dollars into plants and equipment and it is predicted that during the next ten years these expenditures will increase to a staggering 450 billion.

(6) The generation of power by steam, water power, and atomic energy will continue at the spiraling upward rate. Since World War II, use of electric power has been climbing nine per cent per year—each year we have been adding the electrical output of a Hoover Dam and Grand Coulee combined. Total power use has increased from 307 billion kilowatt hours in 1947 to 790 billion today. Our own Toledo Edison Company has expanded during the past ten years from an output of 1.5 billion kilowatt hours to 2.9 billion, or almost double. Toledo Edison estimates that by 1970 their output will increase to 5.2 billion kilowatt hours, again almost double.

There is little room for the engineer who cannot function effectively as a member of a team.

(7) Water consumption per capita will rise by 25 per cent in the 60's, while industrial water usage will double or triple. Water supply in certain areas of our country is scarce—even in our own industrial Ohio. Work on conservation of water including storage, reuse, and reclamation must be redoubled.

(8) Highways will have to be built to accommodate an anticipated increased number of vehicles from today's 71 million to 96 million. It is estimated that the needs of the Federal Interstate Highway system alone will absorb twice the present annual output of the cement industry of America. A recent *Toledo Blade* indicates over $90,000,000 will be spent during the next ten years in the Toledo area for highway improvements.

(9) Today the Gross National Product is estimated at about $480 billion. This figure represents the current value of all goods and services we produce. If we continue the present growth curve, it is estimated that by 1970 this figure will increase to about $740 billion or 54 per cent more than today.

To keep pace with the expanding population and economy, more engineers and scientists will be needed, many more than the rise in population might provide.

THE second challenge facing engineers and scientists is to keep pace with today's rapid technological advances. Many young people have complained in the past that there are no new frontiers to pioneer, no new products to create, no new ideas to develop.

Contrary to that belief, we are just entering a completely new world of breathtaking technological progress, a new "west" to discover and properly exploit. Stop to realize that in 1945, immediately after World War II, the average American had never seen a television screen, never bought a package of frozen food, never had his laundry washed with a nonsoap detergent, never owned a vest pocket size transistorized radio, permitting him to enjoy the World Series while at work, never traveled in an airplane faster than 200 miles per hour, and never entered a completely glass walled skyscraper.

These somewhat ordinary everyday accomplishments have been sidelined by the conquest of the atom and by the penetration into outer space, achievements without parallel in the chronicle of human adventure. The age of technology is not over—it is just beginning. Since World War II, we have essentially succeeded in the conquest of polio; ahead of us is the control of cancer, control of the common cold, and the cause and cure of other baffling diseases which still plague mankind. Scientists and engineers must be available to aid our medical profession in this ever continuing battle.

The sharply rising curve of technological advance is the result of research and engineering. The growth of research and engineering departments in most industries has been phenomenal, so integral a part of business that we often overlook how recently we initiated systematic scientific exploration of the frontiers of knowledge. More has been spent on research alone

in the last four years than in the preceding 15 years. It is estimated that the rate of research and engineering expenditures will increase from thirteen billion in 1960 to 22 billion dollars by 1970. During these ten years American business and government will spend 175 billion dollars to discover and perfect new products and processes.

The progress of man has been illustrated as a function of the speed he has traveled. Man made little progress during the ages when he walked and could only travel four to five miles per hour, or during the age when he rode a horse at eight to ten miles per hour. He began to progress more when, with the aid of steam, he built the first railroad and traveled at the unbelievable speed of 30 miles per hour—later with the automobile at 60 miles per hour—then the airplane at 100-200 miles per hour. Since 1945 what have we done? Man has traveled faster than the speed of sound and transportation speeds of 2000-2500 miles per hour may not be too distant.

Thus, engineers and scientists will be in ever increasing demand to maintain the technological advance required for our very existence.

The third challenge facing engineers and scientists today is to help meet the major threat to American industry of competition from low wage countries. American labor today enjoys the highest wage scale and standard of living ever achieved anywhere. A production worker in America earns from $3 to $4 per hour including normal fringe benefits; based on a 173-hour month, he has an income of from $519 to $692 per month. His European counterpart in progressive countries such as West Germany and Belgium earns only $120 to $170 per month including fringe benefits. While the American worker drives to work in his Chevrolet, Pontiac, or Buick, the European worker has in recent years achieved marked strides forward in personal transportation—a few, and I mean a few, have graduated from two-wheeled, foot-powered bicycles to two-cylinder motor bikes. In fact, ownership of automobiles by the American worker is so universal that America has become the only place in the world where a man can drive up in his own car to collect his unemployment check. Engineers, graduates of some of the world-famous European engineering schools and with several years of experience to their credit, command only a salary of $200 per month plus the use rent-free of a very small house along with minimum utilities. Our young engineering graduate of today often has quite a problem in deciding which job offer to accept, at base salaries of $500 per month and more, to which retirement, bonuses, insurance, medical and other benefits often add as much as $180 per month.

Since World War II, the policy of our government has been to quite freely advance tremendous sums of money for the rehabilitation and strengthening of the free world. To be sure, we have achieved in part the strengthening of the free world economically and militarily, but in doing so, we have provided these countries the most modern technological and production equipment needed to lower their production costs. These costs, already very low by reason of low cost labor, permit their producing and shipping to America's coasts—and through the St. Lawrence Seaway to our very heartland—well designed, beautifully made products for sale as cheap as or cheaper than manufacturing costs for similar American products. Our government seems to overlook this great disparity in labor costs and permits imports of foreign products with unrealistically low tariffs compared to those imposed by foreign governments on comparable products manufactured by us. Since much of Toledo's industry is in the automotive parts field, some examples in that field are appropriate. In June, 1959, a Volkswagon station wagon or "Combie" was manufactured in Brazil to sell there for 430,000 cruzeiros or $3,190, including almost $1,500 federal tax. Today this station wagon shipped from West Germany or Brazil sells for $2,250 in the United States including freight, duties, and all taxes.

An Austin Healy with wire wheels and overdrive will retail in Toledo for $3,495 and will be priced within $100 of this amount in England. A Chevrolet Impala four-door hardtop with powerglide transmission sells for about $3,000 in Toledo. In Belgium this same car sells for $4,300 and in Paris the tag is $6,900.

In Europe, *cartel* arrangements between competing companies divide local and foreign markets, and influence the several governments to establish laws prohibiting imports of American products or making the cost of such imports exorbitantly high. In order to compete, many American companies have been forced to establish manufacturing plants in foreign coun-

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Public speaking and the ability to write clear, concise technical reports are qualities the engineer often finds necessary.

tries, not only to compete in those countries but to compete with exports to America. This has resulted in loss of jobs to American workers and reduced their over-all purchasing power.

Recently we Americans have been content to lean on a termite-infested crutch called "automation," a very fancy but sporific word, and to believe that *automation, American style*, will permit industry largely to offset the disparity in labor rates. At a recent machine and tool show we witnessed several demonstrations of numerical tape control of complicated machining operations. A girl, using a special typewriter, types a complete sequence of operations on a tape. This tape, in turn, controls the operation of the machine, which does practically everything except ask the boss for a raise. Such advances in production technique are encouraging and should assist in permitting the American production worker to continue to enjoy his high wages and standard of living by increasing his productivity.

We cannot, however, accept the premise we are alone in such technological advances, or that we Americans have a corner on all the brains in the world. Our successes in World Wars I and II have convinced many that we are infallible. The advent of "Sputnik" and further Russian successes with satellites and their progress in nuclear fission have tended to dispel that illusion. Oldsters may recall that prior to World War I, the undisputed industrial, engineering, and scientific leader of the world was Germany.

In 1952 and 1955 when I visited several glass plants in Europe, practically every operation witnessed involved considerably more hours of labor per unit of output than comparable American glass plants. Because the Europeans require more labor hours per unit, the difference then between total European and American labor costs was not too great, despite the lower European hourly labor cost. On a repeat visit, I was impressed and somewhat disturbed by the significant technological advances made in five to eight short years. Where formerly we saw as high as four to six men operating a glass melting furnace, and two to three men operating the flat glass forming machines and annealing ovens or lehrs; today we find a doctor of physics operating the melting furnace using an elaborate piano board control panel—fairly remote from the furnace, with every possible physical and chemical operational control being indicated, recorded and controlled. His assistant, a doctor of mechanical engineering, operated the forming machines and lehrs; where six to nine men were used in 1952 and 1955.

Please let me emphasize to you the impact of foreign competition unhampered by adequate tariffs on one segment of American industry, the window glass industry expressed annually in shipments in 50 foot boxes of window glass.

Year	Total Boxes Imported	Boxes Shipped from Libby-Owens-Ford Charleston Plant
1950	474,000	2,360,000
1959	5,600,000	3,032,000

In ten years imports have increased 1090 per cent; the sales from our Charleston plant have increased only 29 per cent, despite the fact the productive capacity has been increased over 50 per cent. When you realize foreign imports have almost equalled two window glass plants the size of Charleston, regarded by many as the largest window glass plant in the world, some idea is obtained of the seriousness of foreign competition from low wage countries.

The same condition holds true in many industries—steel, automotive, and electrical, particularly in production of transistors. The wire nail and fence industry in America is practically defunct. Immediate help in this situation does not seem hopeful, as it seems neither Republicans nor Democrats are willing to initiate corrective tariff measures to meet such competition.

To meet the three challenges of population growth, technological expansion, and foreign competition by reason of low labor costs, many people have argued drastic changes should be made to our educational system, in the colleges and universities as well as in our primary and secondary schools.

Industry has no particular quarrel with the present educational methods of our engineering and scientific colleges and universities. We do feel these schools may be blamed for the deficiencies of some of our primary and secondary schools. A student graduating from high school planning a career in science or engineering should be able to read rapidly and accurately, to spell at least five-letter words, to write legibly, to have a thorough understanding of math including algebra, trigonometry, solid geometry, and some knowledge of mechanics. He should be well acquainted with the fundamentals of chemistry and physics and should preferably have been exposed to at least one foreign language. Most of the primary and secondary schools in Europe require the mastery of two languages besides the native language. Digressing for a moment, we Americans are somewhat conceited and selfish. Wherever we travel, we expect someone to be able to speak and understand *English—even American*. Most of us never acquire the ability to use the other basic languages.

Above all, the high school student should be taught how to study, how to plan his time in preparation of lessons. My sons,

(Continued on page 53)

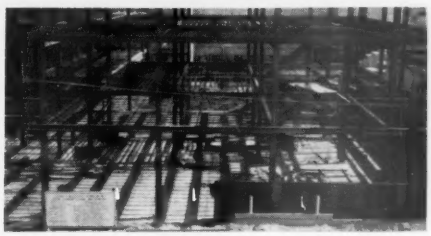
About the Author . . .

Mr. Nyquist

Roy A. Nyquist, P.E., received his B. S. in architectural engineering at the University of Minnesota and began as a consultant in 1927 for Libbey-Owens-Ford Company until 1934 when he joined the regular staff of the company. He was assistant chief engineer and chief engineer until 1955 when he became director of engineering. He is a member of ASCE, American Ceramic Society, American Concrete Institute, American Ordnance Association, and Toledo Chamber of Commerce. He recently was awarded an honorary doctor's degree at the University of Toledo.

Professional Profiles

John R. Wilkie, P.E., (right), receives an "Engineer of the Year" award from John Koch (l.) of International Steel Co., and Prof. J. L. Walings (c.) of Purdue University. Shown here are some of Wilkie's projects: Lower right, the beginnings of a Baptist educational building in Owensboro, Ky.; center, the library at Brescia College in Owensboro; and above, the now completed women's dormitory at Western Kentucky State College in Bowling Green.



QUESTION: How do you build a safe building on a foundation that's essentially quicksand?

Answer: You build it so that it will float.

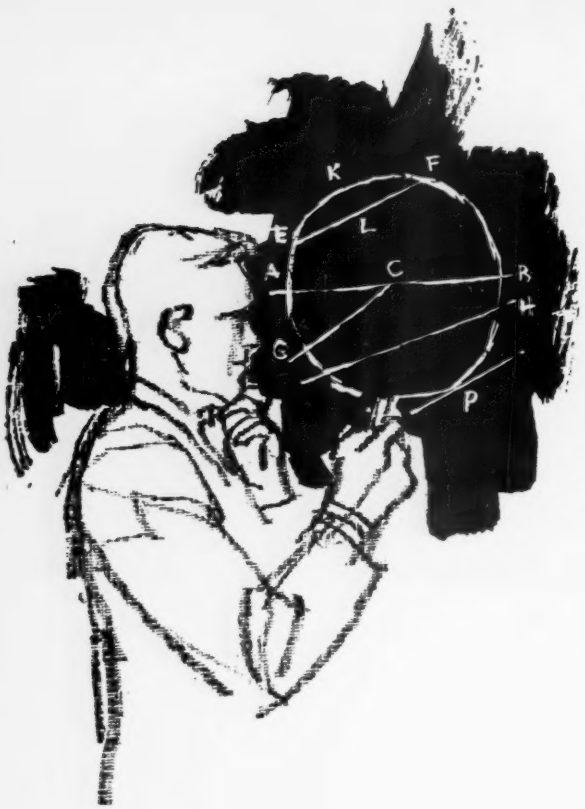
Although it may appear a bit strange at first glance, this is exactly the problem that was recently faced by this month's Professional Profile personality, John R. Wilkie, P. E. of Evansville, Indiana. The answer above was the one he used to solve the problem.

The building in question is a three story (expandable to five) church-connected education building in Owensboro, Kentucky, and it does in fact "float" on a concrete slab on brown, soft, wet sand. The way in which he handled this unusual challenge is perhaps typical of Wilkie's professional competence, and perhaps offers one of the main reasons that his Indiana consulting firm has had to expand four times into larger quarters since 1950, when it was founded.

Probably another reason why Wilkie's firm has expanded its facilities lies in the number of projects that it has successfully handled. Among them: Structural design work on all the new buildings at Western Kentucky State College in the past five years; all of the recent buildings at Brescia College in Owensboro; the Perry County Hospital in Tell City, Ind.; the General Electric Plant at Mt. Vernon, Indiana; and various schools throughout Kentucky. On the drawing boards are a six-story dormitory for Western Kentucky State College and a physical education building for that school which features a 300 ft. diameter clear span roof system, consisting of steel trusses, cables and concrete columns.

These are the projects that John Wilkie has handled, and is working on now. Wilkie himself is a graduate of the University of Illinois, where he received a bachelor of science degree in civil engineering with honors. After working with International Steel Co. in Evansville as a design engineer, and as chief engineer with Truitt Manufacturing Co. in Greensboro, North Carolina, he formed his own firm in 1950.

Wilkie is active in the Indiana Society of Professional Engineers, having served as president of the South Western Chapter, state chairman of the convention committee, and as state director in 1958 and 1961. In 1960, he was honored by ISPE as "Engineer of the Year."



Mathematics Goes Modern

A revolution is underway in the teaching of high school mathematics. What the changes will mean to the engineering profession, and how the individual engineer can help them to be fully effective are discussed here.

One of the traditional fringe benefits that comes of being an engineer is the ability, in a pinch, to pull out a slide rule, perhaps blow a bit of dust off, and help out a son or daughter with the math problem that has the rest of the family stumped at bed-time on a Tuesday evening.

The reason for this is practically self-evident: Engineering, perhaps more than any other profession finds itself based on a mathematical foundation. Throughout his lifetime, the enginer works directly and indirectly with mathematics, and to a measurable extent, the engineer's professional achievement is controlled by his grasp of, and his ability to use, the principles of mathematics.

For the same reasons, the professional engineer has a heavy interest in the caliber of mathematics that is being taught in the schools of his community. It is from these schools that the next generation of engineers will be drawn, and it clearly follows that if these schools do not provide an adequate foundation in mathematics to their pupils, the engineering profession could well suffer.

With this in mind, it is worth quoting the first few sentences of an article appearing on the front page of a recent edition of The Washington (D.C.) *Post*:

"Arlington (Va.) parents, it seems, have been losing considerable face with their offspring because of newfangled mathematics courses being developed in the classroom. But now they're ready for a comback.

"In response to requests from parents baffled by their youngsters' homework, Arlington's Adult Education Department will offer a course this fall called 'A Parent's Introduction to Modern Mathematics.'"

The foregoing is an interesting sign of the times. Probably one of the best indications of the progress in a given area occurs when enough people want to find out what's going on to justify a class explaining the changes. And this, in effect, is exactly what has happened in the areas of high school and junior high school mathematics. The aim, briefly, has been to bring mathematics in the Nation's schools into phase with the space and technology age in which we live.

While changes in mathematics curricula are extending down to the very first grades in grammer school, the most vital changes, from the standpoint of the engineering profession, are at the high school level. At this point the prospective engineer gets away from store-keeping arithmetic, and into the more advanced mathematical principles which he will need and use throughout his professional career.

Whether or not the individual professional engineer happens to have a son or daughter who will be affected by the revisions that are currenty underway, he nonetheless has an obligation to his profession in this regard. If the

engineering profession is to have available the best possible young engineers in the years to come, it must look now to the training these young people are receiving in their high schools.

Although serious efforts directed on a broad scale at more modern high school mathematics are relatively recent, much work has been done in the past five or so years. Any one of a number of studies are available on the subject, and most of the theories that have been developed have been put into practice on at least a limited scale.

There are, for instance, text books available in the newer programs that cover grades seven through twelve. Under one program developed through the University of Illinois all of these grades are covered. For ninth grade mathematics, there are five different texts available, each taking a slightly varied approach to the problem, but each more modern in its concept than traditional text books for these areas.

BASICALLY, all of these attempt to do several things. First, and probably most important, the student is given some grounding in the ideas of higher mathematics, as opposed to rote learning of mechanical procedures. Second, there is a tendency to rely on association, rather than memory drill as the means of learning. Third, the students are given some idea of the variety of uses which mathematics are finding in the current business and scientific world. The statistics of probabilities, linear programming, practical uses of trigonometric functions (such as radio surveying) are a few examples. In short, high school mathematics, having chugged along at the country store level for the better part of the century, is being shifted into gear with the rest of the world.

To make this transition, the groundwork is laid. What remains —perhaps the larger job—is to put the programs to work in schools throughout the Nation. It is in this phase of the task that the engineer, as an individual and through his society, can probably offer the most constructive help. At a recent series of conferences for teachers, aimed at explaining the new approaches to mathematics, eight steps for effective local implementation of math programs were stated:

(1) Recognition by school authorities of the need for a new mathematics program.

(2) Adequate preparation of teachers in the mathematics that is now being taught for the first time in secondary schools.

(3) Selection of a new program.

(4) Selection of students for the program.

(5) Informing parents about the new program.

(6) Informing other members of the school system about the new program, and its implications for the mathematics program from kindergarten to grade twelve.

(7) Continuation of teacher preparation for carrying the new program to higher grades and also to lower grades.

(8) Provision for adequate time and compensation for carrying on the new program year after year.

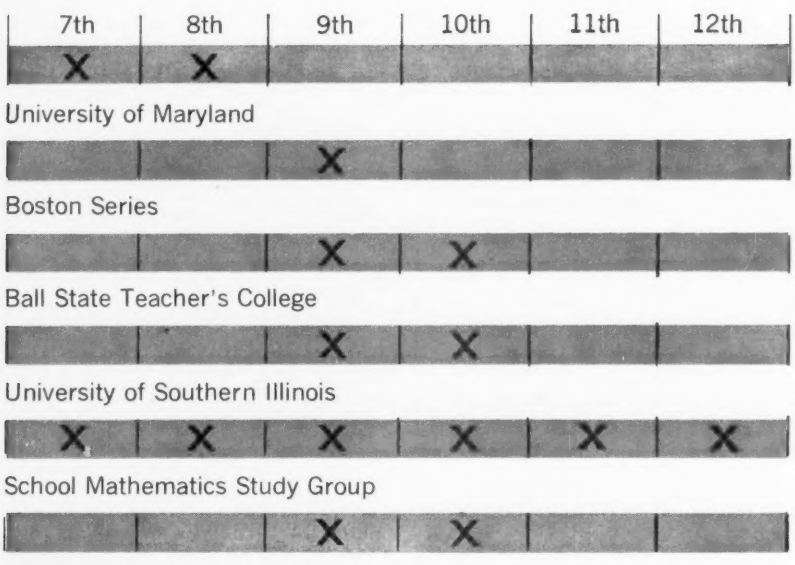
With the possible exception of numbers four and six, all of these steps are ones in which the engineer may be of some help, both to his community and indirectly to his own profession. There is little point in belaboring the need for the change. The problem is one that has been nationally recognized and virtually any responsible engineer is familiar with this need. Likewise, most school administrators are familiar with the basic lack in this respect.

In the selection of the program there is perhaps a more pertinent and vital role for the engineer to play. By being informed on what is available in these various new programs, and by exercising the leadership inherent in his professional standing in the community, the engineer can contribute heavily in this regard.

As the list of reading material (see box) indicates, there is a wide variety of programs that have been developed to a point of use. They are not necessarily independent of each other. The result of this is a reasonably large selection of single or combined programs which can be tailored to meet the

WHAT'S AVAILABLE IN TEXTBOOKS

Grades covered



University of Illinois Committee on School Mathematics

need of the individual community or school. Controlling factors include such things as size of the school, relative abilities of the pupils in a given school, and the number of teachers available. Beyond this, the engineer is in the valuable position of being able to provide liaison between the business world and the high schools. Because of his own education, and his understanding of what is needed in industry, the engineer is in a position where he can and should provide a truly informed vantage point on this subject.

The other two general areas in which the engineer can operate effectively are: First, to insist on proper training, both initial and continuing, for teachers; and, second, to help to inform the general public about the need for the program, what it attempts to do, and why it will be of long-range benefit to the community and the children who participate in it.

ON the first of these, it is axiomatic that any system is only as good as the people who are attempting to make it run. The new approaches to mathematics are exactly that—new approaches. It has already been discovered that there is some resistance to the new methods in the teaching profession. Certainly, the newness of the programs is enough to generate friction, but it has also been found that thorough indoctrination—plus a bit of experience with the new methods—overcomes the vast majority of inertia.

As new materials are developed, a continuing process of teacher-training will be necessary. The aim of the changes proposed for high school mathematics teaching is not only to bring math up to date, but also to allow it to keep on growing as new materials, new ideas and new insights are gained. In this light it is worth noting that National Science Foundation each summer runs a series of seminars and classes with the goal of bringing math teaching up to the highest possible standards for the teachers who attend.

The value of the engineer in any sort of information program regarding these programs again stems from his dual position as a community leader and as a member of a profession with a heavy interest in the development of top level mathematics training for young people. Basically, it is a matter of enlightened self-interest, for the engineer stands to gain both by becoming informed on what is going on in the area of high school mathematics, and by fostering better teaching facilities for prospective engineering talent in the schools.

While the job of the engineer is an important one in selling these new programs, it is also worth pointing out that it is primarily catalytic. Practically everywhere the new mathematics curricula have been tried out, they have sold themselves, given a fair chance. Traditional test results indicate that students working under the new systems are every bit as well trained. More important, there is a tendency for the good student to do better, given the newer methods of teaching. Teachers who have worked with the new systems are equally happy, and once they have become accustomed to the changes, they have been enthusiastic.

At the present, the new teaching techniques for mathematics have been proven to work. The job ahead is to build general acceptance of these programs and to see that they are applied according to the needs of each community across the country. For them to be as effective as they deserve, they must be supported by the teachers who are using them, local school administrations, and perhaps most importantly, by the parents of the children who will benefit by them.

Impetus to achieve these goals must come from community and professional leaders in each community, and of course the engineer falls squarely in this group. By being informed on the programs of improved mathematics teaching, by understanding the needs of his community in this respect, and by exercising his specialized knowledge in this area, the engineer, working alone and through his professional society, can do much to see that these programs get the opportunity that they need—and deserve—to become fully successful.—**End.**

Where to Learn More . . .

The following are sources of additional, and more detailed information regarding changes in high school mathematics curricula, and what those changes can mean for a given community and its students.

"New Developments in Secondary School Mathematics," *Bulletin of the National Association of Secondary School Principals*, May, 1959.

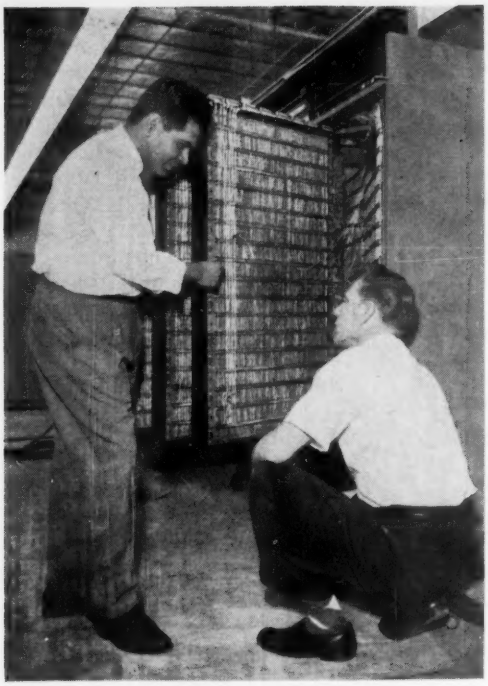
"A Report of the Secondary School Curriculum Committee of the National Council of Teachers of Mathematics," *The Mathematics Teacher*, National Education Association, May, 1959.

"Progress in Mathematics and Its Implications for the Schools," by G. Bayly Price. National Council of Teachers of Mathematics, National Education Association.

"The Drive to Improve School Mathematics," by Kenneth Brown, National Council of Teachers of Mathematics, National Education Association.

"Implementing the New Mathematics Program in Your School" by W. Eugene Ferguson, National Council of Teachers of Mathematics, National Education Association.

Both National Education Association and the National Science Foundation are active in this particular field, and provide good general sources of information.



Logic panel of computer is given the once-over by Kamla Yadav (l.) and Ernie Lundquist, supervisor in the Systems Test section. Kamla works on the logic design of the computer.

A Case of Logic

. . . computer logic—once led this student from India to make a decision about engineering that changed his whole life.

By
TOM HORAN

Public Relations Department
Bendix Computer Division
The Bendix Corporation
Los Angeles, Calif.

When Kamla Yadav arrived in Los Angeles from India seven years ago to become an electronics engineer, he had not only traveled halfway around the globe, but he had also taken a giant step forward in time, measured by the yardstick of industrial development.

Today he is on the engineering staff of Bendix Computer Division, The Bendix Corporation. He works on the logic design of the digital computer—a miracle of electronics that is opening new vistas today in nearly every phase of man's knowledge of the universe.

This is the ultimate paradox in a life that has been lived against the backdrop of vivid contrasts, in a land where television was nonexistent until last year, where most of its people eke out a living from the soil by centuries-old methods, and where electrical power is available in only 20 per cent of its vast area.

If India has been sleeping, by Western standards, today there are indications that this restive, awakening giant is stirring, imbued with the potential of her new role in a world where the old balances of power are shifting.

Industrial development has been rapid since India received her independence from Great Britain in 1947, Kamla says, but she still has a long way to go when compared to the United States or Europe. Electronics, for example, did not exist as an industry until 1957.

India is about 90 per cent agricultural, and farming methods have not changed for centuries. Primitive methods prevail. Ox drawn plows are common in the fields and mechanization is rare.

Nevertheless, some 80 per cent of all students aspire to some type of technical education, feeling that industrialization will spread and will offer more opportunities in the years ahead.

"The people are rapidly becoming more educated. They have more opportunity since independence. There are more public schools," he explained.

However, the economic balance which has prevailed for centuries cannot be overthrown in a few years, even with independence and political change. Only about ten per cent of India's children have been educated at high school level in recent years and a smaller percentage go on to college. Many children are unable to continue because they must go to work to help support themselves and their families. For centuries, the only skill that millions of Indians possessed has been the ability to till the soil. It will be some time before this situation changes. The increased industrialization of recent years is a step toward changing this, he points out.

An informed populace will also be a factor in India's development. At present, the sole television station in the land is an experimental one operated by the government. About two per cent of the people have radios. Newspaper reading is limited by an extremely low rate of literacy, but efforts are being

made to change all this, he says.

Kamla was born in Patna, a city of about 400,000. His father, now deceased, was a businessman. Sometime during his youth (he cannot remember why or when), Kamla developed a desire to be an electrical engineer. Perhaps it was because he lived in a large city where he was "exposed" to electricity and other modern conveniences, and saw the direction of India's future. He attended the University of Patna and was graduated with a bachelor of science degree in mathematics and physics.

"After that, I decided to come to the United States for my engineering degree. Most students were going to the United Kingdom for further technical training, but the U. S. was further ahead in electronics development at the time, so I came here," he recalls.

He was graduated from the University of Southern California in 1956 with a bachelor's degree in electrical engineering. During summers, he worked to help finance his education. After one year with the Southern California Edison Company, he came to Bendix and has been with that firm since.

Language was not a barrier when he came to Los Angeles, because English is widely spoken in India's educational institutions. In fact, it was compulsory at college level until 1950. Now, although not mandatory, it is still widely spoken in university circles. One thing did stump him, however, when he first came to the United States—the difference in accents, such as the Southern drawl and the like.

Another contrast was the American university's grading system and methods. In India, graduation depends on one massive final examination. Here, a student accumulates grade credits each semester and builds up his total over a number of years.

What was the most impressive phase of life in the United States?

"Well, everything is different. I guess you would say life is much faster in every way, both on the job and off," he says. "But I like the American people and their direct methods."

Now 32, Kamla and his wife, Shanti, have two children, Anjali, seven and Eileen, born last Jan. 30. His mother, two brothers and four sisters still live in Patna.

In 1959, he returned to his homeland for a visit and saw the sharp changes made already by industrialization. For the present, at least, he plans to remain in the United States where, he says, opportunities for the technically trained man "are limitless." His decision has been influenced, no doubt, because he is playing an important role in the progress of the electronic computer industry—an industry which, in future years, may help speed the development of the India which Kamla left behind.

He has not ruled out the possibility that someday, when industrialization has become more widely integrated in India's economy, he may return to his native land, bringing his share of experience and knowledge that will help hasten the dawn of a new India.—**End**

Testing device is an aid in determining that electronic components are performing up to par. Above, Kamla peers into the oscilloscope as an assembly is tested.

Intricate assembly used in digital computer is checked against drawing. Kamla and others concerned with computer logic design are constantly seeking ways to improve and refine these mechanisms.

The P.E. License—

What It Means To Industry's Engineers

By
DONALD KOWTKO

ESSO Research and
Engineering Company, Madison, N.J.

THE aura that surrounds the title "professional engineer" is intriguing. It identifies a respected community of people who rank almost as high as doctors, lawyers and bankers in the eyes of the people of this country, and who truly need this communal identity with other "professional engineers." I feel William Wickenden expressed this most eloquently in *A Professional Guide for Junior Engineers:*

". . . A strong sense of comradeship and solidarity exists in all professional groups, whether it finds formal expression in a bar association or in the far ranging talk of a group of artists around a cafe table. The sense of like-mindedness which comes from associating with men of superior talents and training in the pursuit of common goals and which puts service above gain, excellence above quantity, the rewards of self-expression above any pecuniary incentive, and a code of honor and courtesy above the competitive spirit, is one of the most dynamic of all the intangible forces in modern society."

Yet many engineers, today, work for large engineering firms and have no direct need for registration. However, many have obtained their licenses and there are many more who at least aspire to recognition as part of this engineering community.

The effort expended to study for and pass the licensing exams and the yearly fee which must be paid to maintain the license are substantial deterents if this license does not serve a meaningful purpose.

Therefore the only conclusion which can be reached is that there are *other intangible forces* which may be as important to my associates as a direct use in their work which motivates them.

What are these intangible forces and can an order of importance be established for them?

In their work, men are constantly motivated by the forces which are important to them and achieve a certain degree of satisfaction from their job depending upon how well it fits their needs. The needs of professional and semi-professional groups were examined by Robert H. Schaffer in an article in "Psychological Monographs: General and Applied," 1953, who found the following ranked highest in need satisfaction:

Creativity and challenge—The need for meeting new problems requiring initiative and inventiveness, and for producing new and original works.

Mastery and achievement—The need to perform satisfactorily according to one's own standards; the need to perform well in accordance with the self perception of one's abilities.

The professional engineering license which many engineers obtain helps to satisfy some of these needs. After examining these basic needs, the following set of ten related factors was established.

Possible application to job—Many engineers in industry today require a license so that they may certify the correctness and safety of a design.

The trend indicates that even though an engineer may not need a license for his current job, the very next one may require him to testify in judicial proceedings as an expert witness on engineering matters. A court of law will con-

sider him unqualified as an expert unless he is a registered professional engineer.

Higher salary Seventy-five and one-half per cent of engineers indicate they chose that profession originally because of "engineering aptitudes" and only 12.03 per cent gave "financial rewards" as their reason. However, other questions asked of engineers by the National Society of Professional Engineers, indicate that the engineer's rate of pay becomes one of the most important factors in keeping him contented after he gets over his apprenticeship and the attendant glamour of entering a new profession.

Job security—Job security is one of the most important of all motivating forces as indicated by the following remarks made in NSPE publications: "Although they were still small boys when the great depression of the thirties ended, many young graduates of today still remember its dislocations and its effects, perhaps on their own families, and they want a safe berth for themselves in industry."

Greater asset to company—The engineer strives for recognition from his company. If the company has any prestige value, recognition and praise by his company may motivate the engineer. NSPE, in its description of a typical engineer from a recent survey says ". . . He wants to stay with his firm . . . but he wants recognition as a professional and does not think he is getting it to the degree he should."

TABLE I

	DIRECT USE	NO DIRECT USE	TOTAL
Hazen and Sawyer	3	4	7
Moran, Mueser, Proctor & Rutledge	5	8	13
Dames and Moore	1	2	3
Esso Research & Engineering Co.	1	20	21
Howard, Needles, Tammen & Bergendoff	9	25	34
Tippetts, Abbet, McCarthy & Stratton	6	40	46
TOTALS	25	99	124

Higher position in your lifetime—As pointed out previously, a sense of achievement is a very basic need. In fact, this is emphasized throughout the engineer's education each time he receives a grade.

The engineer has a sense of achievement when he gets his license and feels he has advanced his position in life by becoming a member of this elite community, through meeting its rigid standards.

Expected by fellow engineers—An engineer receives the impression that he is expected by his group (fellow engineers) to follow a certain path after graduation. His fellow engineers expect him to establish positive identification with the group as follows: "The aspirations of the engineering college graduate should be to become a professional engineer and to identify himself in the company of those who are qualified to practice in this profession. To acquire this privilege he must become a professional person in his thinking and his actions. Thus, professional registration offers to the young engineer a goal of personal development and an opportunity to serve mankind in a more responsible and privileged manner than that enjoyed by others not so qualified."

Fulfillment of engineering education—The undergraduate degree is certification of book-learning only. The professional engineering license also attests to practical experience and, in a sense, is the important goal for which the engineer strives.

Social equality with fellow engineers—Along with the feeling that he is expected to get a license by his fellow engineers, an engineer may feel he cannot enjoy equality with the others until he has a license.

Family importance—A more remote motivation for obtaining a license may be status in the eyes of the engineer's own family. The fact that his wife can say to her friends, "My husband is a professional engineer," rather than "My husband works in the engineering department of So-and-So Company," may be a factor prompting the engineer toward registration.

Community importance—A professional engineer automatically has certain status in his community and casual acquaintances and neighbors will probably look up to him and respect him because of the accomplishments of his profession. This status may be the important motivation for the engineer closely coupled with his community.

The ten factors noted above cannot truly be separated from each other. Several may be linked to-

Besides benefiting the individual engineer, possession of a professional engineering license makes him a greater asset to the company.

gether and a multiple motivation may be subconsciously from behind a single answer. For instance, a man may say he got his license for the recognition it brings, but this may subconsciously imply more pay also as a secondary motive. Keeping this in mind, we will examine these factors to see how engineers employed by large engineering firms rank the importance of these factors.

A questionnaire was prepared which provided the following information:

- Personal background—Age, education, occupation, size of family, work and professional interests were established.
- Group identification—An effort was made to establish specific group identification since the motivations, of a person with strong community ties might be significantly different from the man who identifies himself with a professional work group.
- Qualitative evaluation of motivation—The ten factors given above were presented to the engineer, one at a time to allow him to consider each separately and give an absolute answer of yes or no. This prompted him to examine each factor on its own merit and establish its importance or unimportance as a motivating force for himself in his own mind.
- Quantitative evaluation of motivation—The engineer was asked to arrange these ten factors in decending order of importance. Thus the engineer could critically weigh one factor against the other and weed out the less important factors. Giving a weighting to the ranking establishes the order in which we are interested.

Six engineering firms of varying size in the New York metropolitan area were contacted and agreed to participate in the poll. Approximately 300 questionnaires were sent out and 156 replies were received. Of these, 124 were people who had their professional engineering license or were interested in obtaining it in the near future. However, only 25 out of the 124 usable replies visualized any direct use for their license. The companies polled and the responses from each are given in Table I.

The results of this survey indicate that the average engineer ranks the ten factors in the following order of importance:

(1) A professional engineering license will help me to achieve a *higher position* during my lifetime.

(2) I am a *greater asset* to my company with a professional engineering license.

(3) My license will allow me to command a *higher salary* in industry.

(4) I got my license because it may have *direct application* to my job.

(5) A professional engineering license provides me with *job security* because I have something more to offer my company.

(6) Registration is the *fulfillment* of my *engineering education.*

(7) My *fellow engineers* expect me to obtain my professional engineering license.

(8) I need my license to maintain *social equality* with other engineers.

(9) My *neighbors respect* my opinions because I am a professional engineer.

(10) My *family* feels it is important for me to have my professional engineering license.

Because of the relatively weak response for the last three items, they do not seem to be significant factors.

About the Author . . .

Mr. Kowtko

David Kowtko is a graduate of the Cooper Union School of Engineering, and recently received his master's from the Newark College of Engineering. He is presently employed at ESSO Research and Engineering Company in Madison, N.J., as a cost engineer. He is a member of the American Society of Civil Engineers and serves on the following committees: Committee on Student Chapters; Publications Committee; Committee on Associate Membership; Society Officer Candidates Committee; Hospitality Committee; and Committee on Student Guidance. He is presently president of the Associate Member Forum of ASCE's Metropolitan Section.

Many people may be surprised with the fact that advancement and status take precedence over job security which consistently ranks higher with workers, however, this attitude can be explained. First of all, the engineer sets his standards by that of executives.

> "Without realizing that he is of a class in aptitude distinct from that of executives, he judges the ceiling for his profession by their advancement and promotion, but his is set by the salary curve of his type. That their situation is not his he overlooks because of the human tendency always to see success is still possible and just around the corner." (John Mills in *The Engineer in Society.*)

Although a worker's circumstances make security of prime importance to him, the executive's motivating forces are upward mobility, prestige and status. Since the engineer indentifies his motives as similar to executive's motives, it is not surprising that advancement is so important to him.

The fact that the professional engineering license meant higher salary ranked third can be explained by the following:

> "However, registration in many firms is considered a major factor in evaluating employees for promotion, more responsible work and more opportunities for individual thought and discretion. A natural corollary to this is additional compensation." (NSPE Engineer in Industry Committee in *Questions and Answers About Registration for Engineers in Industry.*)

In other words, more money is a welcome secondary reward which naturally comes with achievement and recognition.

From these results, one must conclude that the forces which motivate the average engineer to obtain a professional engineering license are the basic needs of opportunity for advancement, professional recognition, security and a sense of personal achievement. These needs, in roughly the same order, are the prime requisites of job satisfaction for the engineer.—**End**

Report on a Case by the Board of Ethical Review

The Board of Ethical Review was established to provide service to the membership of the NSPE by rendering impartial opinions pertaining to the interpretation of adopted Canons of Ethics and Statements of Policy regarding professional conduct. The *American Engineer* will print findings on specific cases as they are reported by the BER to the NSPE Board of Directors.

Case No. 60-2

Subject:

Competitive Bidding—Professional Services—Canon 26, Canons of Ethics; Rule 48, Rules of Professional Conduct; Rule 49, Rules of Professional Conduct; Rule 50, Rules of Professional Conduct; Rule 51, Rules of Professional Conduct.

Facts:

Engineering firms "A", "B" and "C" are separately invited by a client to appear at an interview to discuss various aspects of an engineering design project which the client has under consideration. Each invitation makes it clear that the interview will be of a preliminary nature, following which the firm may be selected for the project. At the separate interviews, unknown to each other, each firm is asked to submit in writing a detailed proposal of the scope of the services to be furnished, including a statement of the estimated charges for engineering services, expressed in terms of money, man hours or other work units. Prior to submitting such a proposal, each firm learns that the others have also been asked to furnish similar information.

Questions:

1. Would it be proper for the firms, acting independently, to provide the client with a statement of the estimated charges for engineering services expressed in terms of money, man hours or other work unit information?

2. On learning of the full facts, were the engineering firms obligated to decline to participate further?

References:

Canons of Ethics—Canon 26—"He will not compete with another engineer on the basis of charges for work by underbidding, through reducing his normal fees after having been informed of the charges named by the other."

Rules of Professional Conduct—Rule 48—"The practice of engineering is a learned profession, requiring of its members sound technical training, broad experience, personal ability, honesty and integrity. The selection of engineering services by an evaluation of these qualities should be the basis of comparison rather than competitive bids."

Rule 49—"Competition between engineers for employment on the basis of professional fees or charges is considered unethical practice by all professional engineering groups. Any engineer who is requested to submit a competitive bid to an owner or a governmental body should remove himself from consideration for the proposed work."

Rule 50—"Should the engineer be asked for a proposal to perform engineering services for a specific project, he should set forth in detail the work he proposes to accomplish and an indication of the calendar days required for its accomplishment. The engineer's qualifications may be included if appropriate. A statement of monetary remuneration expected shall be avoided until he has been selected for the proposed work.

"Should the owner insist upon a statement regarding remuneration prior to selection of the engineer, the engineer may designate the recognized professional society minimum fee schedule for the particular type of service required in the geographical area where the work is to be done."

Rule 51—"He will take a professional attitude in negotiations for his services and shall avoid all practices which have a tendency to affect adversely the amount, quality, or disinterested nature of professional services; such as charging inadequate fees for preliminary work or full services, competing for an engineering assignment on a price basis, spending large amounts of money in securing business or consenting to furnish monetary guarantees of cost estimates."

NSPE Policies — "Competitive bidding for Professional Services." The practice of engineering is a learned profession requiring of its members sound technical training, broad experience, personal ability, honesty and integrity. The selection of engineering services by an evaluation of these qualities should be the basis of comparison rather than competitive bids.

Competitive bidding by engineers for employment on the basis of professional fees or charges is considered unethical practice by all professional engineering groups, and makes it necessary for the engineer to remove himself from consideration.

Since the securing of competitive bids for professional engineering services is not in the best public interest and as such procedure frequently results in the awarding of the work to other than the best qualified engineer, the National Society of Professional Engineers does now and herein express itself as opposed to competitive bidding for professional engineering services and recommends the practice of negotiating contracts in all cases where it may be necessary or desirable to consider the service of more than one engineering consultant or organization.

Definition of Competitive Bidding—Competitive bidding for professional engineering services is de-

(Continued on page 55)

The Role of Private Engineering in Government Projects

By
FRANK H. NEWNAM Jr., P.E.
Lockwood, Andrews & Newnam,
Consulting Engineers

DURING the past several years, there have been confusion, and considerable honest differences of opinion concerning the proper role of private engineering in government projects. While the word "government" immediately brings to mind the Federal Government, the problem exists at all levels of government—municipal, county, state and federal. Since the same principles are involved in each case, the subject can be discussed with the understanding that the word "government" includes all of these levels.

This discussion will examine the several viewpoints and present specific recommendations concerning the portion of government engineering that should be handled by private engineering firms. These recommendations are designed to best serve the public interest. They entail wide departures from present practices in the case of many agencies.

The writer has the temerity to make recommendations on this subject only because more than half of his 31 working years were spent in the employ of government agencies; eleven years in municipal and state employment, five years for the Federal Government, and 15 years in private engineering practice.

The term "private engineering" is used rather than "consulting engineering" because the latter has become a misnomer. The word "consultant" envisions an individual reviewing and reporting upon some general or specific feature of a project. Consulting engineering, or private engineering, as it is carried out today usually means a staff of engineers, designers, draftsmen and field engineers applying their combined talents to plan, design, and supervise construction of a project.

There seems to be general agreement in the public statements of most governmental agencies that government engineering should be produced by a "team effort" with private concerns supplementing the work of the governmental engineering staffs. The difference of opinion appears to be as to when, how, the extent of use that will be made of private engineering firms, and the extent to which they are actually used. A former fellow worker was once asked if a certain high ranking executive was a "good team man." He replied, "Yes, Charlie is a good team man—if you let him be the captain." This is not the problem here. On any project of government its own staff must obviously be the captain, but the captain shouldn't call his own number to "carry the ball" on all the plays.

The basic need for the use of private engineering services usually falls into two broad categories, namely, to supply specialized knowledge not readily available on the client's staff, and to supply an additional engineering staff for temporary overloads. The client frequently has a capable engineering staff, often including specialists in their particular field of work.

The need for the supplemental private engineering service is often quite apparent in the case of a small governmental organization. For example, if a county or municipal government undertakes a large bridge, it would not normally be staffed for this type of engineering work and would engage a private engineering firm. In the case of the larger governmental organizations, however, particularly in the case of the Federal Government, the need for the use of utilizing private engineering services is not so apparent. In these cases, a fairly large engineering staff is required to handle the minimum engineering work and it is a characteristic of human nature for this staff to want to add more people when a heavier work load is incurred. This tendency is augmented by a well known "evil" of the Civil Service system, whereby an individual's promotion under Civil Service is related to the number of his subordinates. When consideration is being given to the use of private engineers for some of the work overload, the reaction of the staff engineers is nearly always, "We alone can do it—this is very specialized work and outsiders can't do it satisfactorily." This answer has proved to be fallacious in virtually every case. Private engineering firms are successfully and economically designing dams all over the world, have designed most of the toll roads and many freeways. They are assisting in the design of all of the newer missiles and space programs of government; the list of examples is too long to enumerate.

Actually, there are numerous corollary advantages that will ac-

(Continued on page 48)

New Literature

DRIVES AND COUPLINGS—A simplified method for selecting Flexidyne Dry Fluid Drives and Couplings for most industrial applications is featured in a new 20-page bulletin. Eight stock drives and eleven stock couplings are listed for fractional to 1,000 hp requirements, together with actual installation photographs, product pictures and engineering drawings. Introduction explains operating advantages such as soft starts, protection of motors against damage caused by overloads, and low current draw at start. Bulletin also has tables of weights, dimensions and prices, two types of cutouts to shut off motors in case of prolonged slippage due to unattended overload, and tables of recommended V-belt drives for use with Flexidynes of various sizes.

(Circle 15 in Readers' Service Dept.)

STEEL PULLEYS—A brochure describing the new one-piece steel "Curve Crown" pulleys, featuring exclusive spun end construction recently developed by Stephens-Adamson Mfg. Co., now is available. All end plate weldments have been eliminated in the fabrication of the new spun end pulleys, according to Stephens-Adamson engineers. Thus, principal sources of metal fatigue, stress, and other trouble have been eliminated. The result is a pulley which inherently is much stronger than previous types. The new pulleys are available up to 24 inches in diameter. The new brochure also describes the "Squeeze Lock" hub which exerts equal locking forces in two directions, to both the shaft and pulley end plates. Other sections of the eight-page brochure include a "Curve Crown" pulley load rating chart, dimensions and weights for "Curve Crown" pulleys, and charts which show a comparison of belt training effects for various types of pulleys.

(Circle 16 in Readers' Service Dept.)

COUPLING FOLDER—"Flexible Flanged Coupling Adapters" is the subject of a new twelve-page, two-color

brochure just issued by Smith-Blair, Inc. It gives detailed information on how these products enable flanged meters, valves, regulators, etc., to be quickly and easily installed or removed, have flexibility, and occupy smaller space. Charts show the complete range of plain and machine end pipe sizes and flanged fittings that can be accommodated. Particulars on insulating, use of anchor studs, and harnessing the fittings are also given.

(Circle 17 in Readers' Service Dept.)

FIRE ALARM SYSTEMS—The S. H. Couch Company, Inc., has published a new bulletin, #131A, describing their Modular Fire Alarm Systems of advanced design. The 26-page, two-color booklet tells of each of the Couch systems, giving the outstanding features of each, manual stations, alarm signals, thermal detectors, remote trouble-indicating and testing devices, annunciators, as well as a complete glossary of terms for anyone only recently introduced to their use. Charts, diagrams, and the many illustrations make this booklet an easy-to-use reference guide with quick answers.

(Circle 18 in Readers' Service Dept.)

STRATO-TOWER—A new, 16-page catalog covering the complete line of Ottawa Strato-Towers was recently released by Equipment Division, Young Spring & Wire Corporation. Fully illustrated, the two-color catalog outlines the variety of Strato-Tower models available, detailing the specific data on each type. Easy-to-read charts cover the heights and working capacities of each of the 30 models, ranging from 30 feet to the world's largest hydraulic aerial tower at 104 feet. Specifications cover the standard and reversing elbow towers, permanently mounted and detachable units, and include details on the brand new Fiberglas-boom for all Strato-Towers. Features of the line are detailed and one section illustrates the variety of applications on which the units are used across the country. Power drives, lifting capacities, types of rotations and optional features, such as catwalk and power tool lines to the basket, are shown.

(Circle 19 in Readers' Service Dept.)

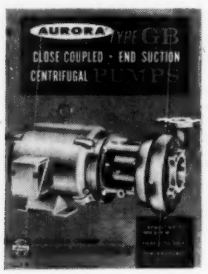
NON-CLOG PUMPS—A new approach in bulletin layout and content is used by Chicago Pump in Bulletin 124-G to introduce its complete line of vertical, enclosed shaft, nonclog VCS pumps. These pumps are designed for sewage, sump or storm water service in institutional, industrial, municipal and commercial applications with capacities from 50 to 5000 GPM and heads to 105 feet. Bulletin #124-G has been planned for the busy design and layout engineer, as it systematically and in sufficient detail, describes a simple method for determining nonclog pump head and capacities. Followed in logical order are easy to use pump and motor selection tables; preliminary layout dimension data on the pumps, basins and basin covers; engineer specifications; illustrated details of the necessary controlling devices, optional equipment and installations.

(Circle 20 in Readers' Service Dept.)

REPRODUCTION PROCESSES—A newsletter geared to keep industry abreast of the latest industrial reproduction processes and materials is now being published by Eastman Kodak Company. The first edition of "The Kodak Compass" is now ready for distribution. Plans call for publishing the newsletter three to four times a year, and more often if the need arises. It will be available free of charge. Editorial matter in the newsletter will be concerned chiefly with the "how to" phase of industrial reproduction, bringing up the latest information on drawing techniques and reproduction processes and materials. The bulletin-type newsletter measures 8½ x 11 inches, has double column pages, and is printed in two colors.

(Circle 21 in Readers' Service Dept.)

END-SUCTION PUMPS—Eight-page Bulletin 108 illustrates and describes the new Type GBH Close-Coupled



End-Suction Centrifugal Pumps, recently announced by Aurora Pump Division, The New York Air Brake Company. Also included are cross-sectioned views, selection chart, dimensions, optional assembly positions, parts identification, limitations chart, and specifications. Especially designed for high efficiency and low horsepower requirements, these pumps are suitable for a wide variety of OEM applications, cooling towers, air conditioning systems, boiler feed, condenser circulation, and general liquid services handling hot or cold liquids. Outstanding features include: Interchangeable mechanical seal or packing inserts; optional water jacketed inserts to accommodate hot liquids to 250° F; balanced cast impellers keyed and locked in position; shaft sleeve construction with "0" ring seal; extra long casing rings; balancing rings; and optional impeller rings.

(Circle 22 in Readers' Service Dept.)

UNDERWATER CEMENT—A new 20-page comprehensive report on Speed Crete, the underwater and all purpose bonding cement that sets in four to six minutes without the use of forms, is now available to engineers and other interested parties. Speed Crete is especially useful in restoring and barrier coating wooden piling to prevent damage from marine borers and also to coat steel to prevent corrosion. Speed Crete sticks to wood, cement, steel, etc.

(Circle 23 in Readers' Service Dept.)

VALVES—Conoflow Corporation, leading control valve manufacturer, has just issued a new bulletin describing the company's complete line of Series LB all purpose, split body control valves. Bulletin LB-4 is a well illustrated 16-page booklet which gives details on construction and operation of the single seated, split body LB valve. It points out the numerous maintenance-savings features of the split body design with seat ring that drops out when body halves are separated in addition, the bulletin describes how the LB valve gives greater spare parts savings, absolute tight shut off and unequalled versatility. Operation of the standard Cylinder Conomotor actuator with Model J positioner and exclusive piston lipseals is described, and optional actuators and accessories are shown.

(Circle 24 in Readers' Service Dept.)

BONDED RESURFACING—The Larsen Products Corporation has just published a four-page booklet on the Pittsburgh Testing Laboratory's report on Weld-Crete Tests. Statistics, conclusions, and testing procedures are clearly described in the pamphlet enabling the reader to glean the contents of the report quickly. The project was designed as comparative flexural strength tests of a monolithic beam section against a section of equal depth containing a two-inch topping bonded to the lower section with Weld-Crete.

(Circle 25 in Readers' Service Dept.)

ELEVATED FLOORING—Liskey Aluminum, Inc.'s, elevated flooring, Elaflor, is described in a four-page, four-color bulletin recently published by the manufacturer. The bulletin shows illustrations of the elevated floors where now in use, and with cutaway views, enables the reader to see the various advantages of this type of flooring.

(Circle 26 in Readers' Service Dept.)

THICKENERS—A new 24-page brochure, Bulletin No. 3002, describes the complete line of Dorr-Oliver Thicken-

ers for chemical, metallurgical and industrial processing. The new brochure describes and lists standard sizes and specifications for the modern thickener designs and mechanisms resulting from more than 50 years of continuous engineering and design experience since the original invention in 1906 of the Dorr Thickener. Single and multiple compartment thickeners are described having both center drive and perimeter drive rakes in a variety of configurations for unit operations in all the process industries.

(Circle 27 in Readers' Service Dept.)

SURGE ARRESTOR VALVE—New 16-page Bulletin W-16 describes the Golden-Anderson Cushioned Surge Arrestor Valve that anticipates the surge to protect the system. Pilot controls automatically open main valve on abnormal pressures, subnormal pressure, or electrical power failure. Complete technical details and drawings are included.

(Circle 28 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in these columns, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

NSPE Joins with AIA for Meeting on Education Theme

Roanoke—Star City of the South—will be the location for the Fall Professional Meeting of NSPE. The meeting will be held at the Hotel Roanoke, October 19-21, jointly with the Virginia Society of Professonial Engineers and the American Institute of Architects (Virginia Chapter).

A General Meeting Committee under the co-chairmanship of William P. Mounfield, AIA, representing the AIA Virginia Chapter, and Charles K. Whitescarver, P.E., representing VSPE, has been working for over a year to make this combined meeting the most successful yet.

The timing for this meeting is particularly attractive as it coincides with Roanoke's Annual Harvest Festival, which culminates with the famous Harvest Bowl between Virginia Polytechnic Institute and the University of Virgina on Saturday, October 21. In addition, October is considered one of the most scenic months in Virginia. Roanoke, located in the Shenandoah Valley with the Blue Ridge Mountains to the east and the Alleghenies to the west, is the headquarters for the famous Blue Ridge Parkway.

"Color for Fashion and Living" is the general theme of the Festival program, and attention is called to the interesting program which the Ladies Program Committee has developed around this idea. Since three groups—NSPE, AIA, VSPE—will be in attendance, it is anticipated that a large number of ladies will be present.

Over 80 of America's leading firms will have their products on display at Exhibit Hall in the hotel. Exhibiting practically everything needed to build a structure, it will give engineers a good opportunty to view new products and processes. To make attendance additionally inviting, there will be substantial prizes awarded on Thursday and Friday, with the grand prize to be awarded Saturday morning.

The NSPE Professional Meeting gives promise of stimulating discussion of numerous professional topics. Full details of the program are carried in this section. The premiere of the new NSPE film *George Spelvin, P.E.* will be a highlight of the meeting.

The general theme of the meeting—Education for Architects and Engineers to Meet Today's Needs—will be initially developed in an address at the Friday luncheon by Dr. John W. Shirley, dean of faculty, North Carolina State College. This theme will be more extensively explored in the afternoon by a panel featuring an engineer educator, an architect educator, an engineer in practice and an architect in practice. Moderator for the panel will be Charles F. Savage, P.E., consultant, Engineering Professional Relations, General Electric Company, New York.

The banquet Friday evening will feature "A Virginia Dinner." The entire evening has been planned to afford all guests a maximum of entertainment, with a banquet presentation by Robert Schmertz, architect-humorist, to be followed by dancing in the Ballroom.

Hotel Roanoke

The Hotel Roanoke, shown left, will be the scene of the meetings of NSPE, the Virginia SPE, and the American Institute of Architects, Virginia Chapter beginning October 18.

Program for Roanoke's NSPE-AIA-VSPE Meeting

WEDNESDAY, OCTOBER 18

9:00 a.m.-5:00 p.m.—NSPE Executive Committee

THURSDAY, OCTOBER 19

9:00 a.m.—NSPE Executive Committee

9:00 a.m.—NSPE Functional Section for Consulting Engineers in Private Practice Executive Committee (Open Meeting)

10:00 a.m.—Registration (No charge for registration. Compliments of Old Dominion Architects and Engineers)

2:00 p.m.—FORMAL OPENING OF PROFESSIONAL MEETING

Welcome by Hon. Willis M. Anderson, Mayor of Roanoke
Roll Call of Members of the Board
Reading of Minutes of Previous Meeting
Reading of Communications
Report of Executive Director
Report of Treasurer
Report of Executive Committee
August 3-4, 1961, Meeting
October 18-19, 1961, Meeting

PROFESSIONAL DEVELOPMENT GROUP — Vice President Stufflebean, P.E., presiding

Plans for Young Engineers' Month
Frederick B. Morse, P.E., Chairman, Young Engineers Committee
Progress Report on the Student Contact Program
J. Neils Thompson, P.E., Chairman, Student Professional Development Committee
Survey of Current Presentation of Professionalism in Engineering Colleges
W. H. Parks, P.E., Chairman, Education Committee
Report of Actions at NCSBEE Annual Meeting
M. E. Amstutz, P.E., Chairman, Registration Committee

PROFESSIONAL RELATIONS GROUP — Vice President Hanes, P.E., presiding

Recommendations regarding Status of NSPE Representatives on the EJC-AIA Joint Committee
G. H. Dyer, P.E., Chairman, Inter-Society Relations Committee
Progress Report on Institute for Certifying Engineering Technicians
A. C. Friel, P.E., Chairman, Engineering Technicians Committee
Final Results of Uniform Telephone Listings Survey
H. W. Honefenger, P.E., Chairman, Ethical Practices Committee

5:00 p.m.—Reception

6:45 p.m.—Dinner—W. Earl Christian, P.E., Vice President presiding

Address: The State of the Society
Murray A. Wilson, P.E., President NSPE

Following Dinner — Professional Meeting Continues

ORGANIZATIONAL FUNCTIONS GROUP — Vice President Pierce, P.E., presiding

Advertising and Editorial Policy for 1962
F. W. A. Myers, P.E., Chairman, American Engineer Committee
The New Membership Manual
Junior Member Membership Contest
J. B. Hazen, P.E., Chairman, Membership Committee
Progress Report of State and Chapter Activities
Leroy Martin, P.E., Chairman, State Society and Chapter Activities Committee

FRIDAY, OCTOBER 20

7:30 a.m.-9:30 a.m.—Regional Breakfasts and Meetings

9:30 a.m. — PROFESSIONAL MEETING CONTINUES

PUBLIC RELATIONS GROUP—Vice President Mann, P.E., presiding

Thoughts on Professionalism...

By PAUL H. ROBBINS, P.E.
NSPE Executive Director

The Changing Pattern of Engineering

It was recently stated that engineering today is faced with a challenge created by the necessity for the profession's leaders to appreciate fully the changes which have occurred in the last ten years and which will continue to occur. Unfortunately, all of us tend to analyze our problems and to offer solutions in terms of our own background of education and experience. We must view today's professional problems not only in terms of engineering today, but also as we foresee the role of engineering and engineers in the years ahead.

One of our leading educators recently drew with startling clarity a comparison of the education received by most of his listeners with that being given to the young engineer of today. He pointed out that solution to present engineering problems requires a basic knowledge of science and mathematics as well as the new applied technologies, all far in advance of the traditional four-year education received prior to World War II. To accomplish this depth of training in the traditional four or five years has required the elimination of certain skill and craft training which engineering graduates prior to that time received. With this changed pattern of engineering education, it means that the young graduate today is ill-equipped, if not unable, to do a number of jobs traditionally assigned to engineers in the past. This evolution requires some introspection on the part of a number of groups concerned with the engineering profession.

- Education, government and industry must exert an increasing concern for the role of the technician. Provision for his training must be made. Those who have need for his services must evolve policies and procedures for his stimulation and growth. Engineers must learn to utilize and work with technician supporting personnel.
- State societies of professional engineers and registration boards need to make critical evaluations of both the method and content of examination requirements for registration.
- The users of engineering services, whether they be industry, government or private practice, need to evaluate utilization techniques and specific assignments to be given engineering graduate.
- Personnel people will need to devise personnel policies essential to challenge both the professional engineer and create the proper relationships and working atmospheres for the engineering technician.
- Continuing concern must be exercised for delineation between scientific and engineering work so that career patterns will be clearly outlined for each.

This changing pattern of engineering is a challenge to the professional society, the individual engineer and to the users of engineering services. Each must be careful to analyze patterns of development and suggested programs not in terms of engineering as it once was, but in terms of engineering work today and, as he expects it to be in the years to come.—**End.**

Engineers' Week Plans for 1962
W. C. Stadden, P.E., Chairman, Engineers' Week Committee

Premiere of New NSPE Film—George Spelvin, P.E.
P. M. Kimmell, P.E., Chairman, Public Relations Committee

Noon — Reception and Luncheon — Russell Berkness, P.E., President, VSPE, presiding
Address: Dr. John W. Shirley
Dean of Faculty
North Carolina State College

2:30 p.m.—Panel Discussion (See Box)

6:30 p.m.—Reception

7:30 p.m. — Banquet — Fleming R. Hurt, President, Virginia Chapter, AIA, Presiding
Presentation: Mr. Robert Schmertz
Architect—Humorist

9:00 p.m.-1:00 a.m.—Dancing

SATURDAY, OCTOBER 21

9:00 a.m.—PROFESSIONAL EMPLOYMENT GROUP—Vice President Wegner, P.E., presiding

Rules of Procedure for Engineers in Industry Functional Section

Proposed Revision of Sounding Board Policy
R. G. Hoft, P.E., Chairman, Engineers in Industry Committee

Competitive Bidding for Surveying Services

Relations with Government Agencies

Regional Meetings of Consultants

Registration of City Planners
G. S. Rawlins, P.E., Chairman, Functional Section for Consulting Engineers in Private Practice

Legislation to Require Registration of Federal Engineers

Comments on Revised Qualification Standards for Federal Professional Engineer Positions

Employee-Management Relations in Government
W. E. Gilbertson, P.E., Chairman, Functional Section for Engineers in Government Practice

POLICY OPERATIONS GROUP — Vice President Christian, P.E., presiding

Revisions to 1961 Budget
Adoption of the 1962 Budget
W. Earl Christian, P.E., Chairman, Budget Committee

Professional and Administrative Policies Review
J. B. McGaughy, P.E., Chairman, Policy Review Committee

Report of Constitution and Bylaws Committee
W. S. Gordon, P.E., Chairman, Constitution and Bylaws Committee

Delineation of Responsibilities of Interprofessional Relations Committee, Functional Section for Engineers in Private Practice, and EJC-AIA Joint Committee
B. H. Backlund, P.E., Chairman, Organization and Functions Committee

Resolutions
A. J. McGaw, P.E., Chairman, Resolutions Committee

NEW BUSINESS

ADJOURNMENT

PANEL DISCUSSION

2:30 p.m. Education for Architects and Engineers to Meet Today's Needs

Moderator: Charles F. Savage, P.E.
Consultant, Engineering Professional Relations
General Electric Company
New York, New York

Dean Loyal V. Bewley
College of Engineering
Lehigh University
Bethlehem, Pennsylvania

Harlan E. McClure, AIA
Dean, School of Architecture
Clemson College
Clemson, South Carolina

Vincent G. Kling, FAIA
Philadelphia, Pennsylvania

Edward J. Benesch, P.E.
Syska and Hennessy, Consulting Engineers
New York, N.Y.

VSPE MEETING

Thursday, October 19

10:00 a.m. ..... Registration
2:00 p.m. ..... VSPE Executive meeting
4:00 p.m. ..... Visit exhibits
5:00 p.m. ..... Reception-Dinner
8:00 p.m. ..... VSPE Board of Directors meeting

Friday, October 20

8:00 a.m. ..... VSPE Committee breakfasts
10:00 a.m. ..... Visit exhibits
Noon ..... Reception and luncheon
2:30 p.m. ..... Panel discussion: "Education for Architects and Engineers to Meet Today's Needs"
4:00 p.m. ..... Visit exhibits
6:30 p.m. ..... Reception
7:30 p.m. ..... Banquet, to be followed by dancing to 1:00 a.m.

Saturday, October 21

7:30 a.m. ..... Breakfast—VSPE Functional Section for Engineers in Private Practice
9:00 a.m. ..... Visit exhibits
10:00 a.m. ..... VSPE Membership meeting

AIA MEETING

Thursday, October 19

10:00 a.m. ..... Registration
2:00 p.m. ..... AIA Executive Board meeting
4:00 p.m. ..... Visit Exhibits
5:00 p.m. ..... Reception-Dinner
8:00 p.m. ..... AIA Executive Board meeting

Friday, October 20

9:00 a.m. ..... AIA Committee meetings (Details to be on Bulletin Board at Registration Desk)
10:00 a.m. ..... Visit exhibits
Noon ..... Reception and luncheon
2:30 p.m. ..... Panel discussion: "Education for Architects and Engineers to Meet Today's Needs"
4:00 p.m. ..... Visit exhibits
6:30 p.m. ..... Reception
7:30 p.m. ..... Banquet, to be followed by dancing to 1:00 a.m.

Saturday, October 21

9:00 a.m. ..... Visit exhibits
10:00 a.m. ..... AIA Membership meeting

LADIES PROGRAM

Thursday, October 19

2:30 p.m.	"Fashions With A Flair" Models from Roanoke's leading stores present ladies' fashions at Marine Armory. Transportation from the hotel will be available.
5:00 p.m.	Reception—with men
6:45 p.m.	Dinner—with men
8:30 p.m.	Get-acquainted party

Friday, October 20

Morning	Coffee and get-together in Hospitality Room
Noon	Reception and luncheon—with men
2:00 p.m.	Scenic bus tour—Blue Ridge Parkway
6:30 p.m.	Reception—with men
7:30 p.m.	Banquet and dance

Saturday, October 21

Morning	Shopping in Roanoke
11:30 a.m.	Parade
Afternoon	Harvest Bowl—VPI vs U. Va.

Education Program Planned for Baltimore Engineers

Engineers in the Baltimore area will have an opportunity to brush up on courses they missed in college as well as developments that have occurred since their formal education was completed by taking part in a new education program for engineers.

Sponsored by the Engineers Club of Baltimore and the Baltimore Chapter, Maryland Society of Professional Engineers, the program consists of a series of nightly lectures which will run through the fall. Courses during the current session will concentrate on four areas: English for engineers, speed reading, the business end of engineering, and professional concepts of engineering.

Scheduled to start in early October, the purpose of the program will be to bridge the educational gap between formal technical training and practical experience. From this beginning, the Education Committee sees many needs which could be filled by the continuation of such a program: Improvement of basic skills of reading and writing; improvement in technical skills in specific fields of engineering; new developments in specific fields of both materials and methods; "brushing up" on certain subjects, particularly for those who have yet to take the professional engineering license examination; the need to learn more about the business and administrative ends of engineering as well as the psychology of dealing with people; and the legal phases of engineering.

Lecturers for the courses will be recognized authorities in each respective field.

"Bring in one for SIXTY-ONE"

You probably intended to all spring and summer. Don't forget, however, that people will judge you by your *actions*, not your intentions. You may have a heart of gold—but so has a hard-boiled egg.

Do it now!

NSPE Dates to Remember

West Virginia Society of Professional Engineers—Annual Meeting, October 5-6, Morgantown, West Virginia.

Wyoming Society of Professional Engineers—Annual Meeting, October 13, Laramie, Wyoming.

Virginia Society of Professional Engineers—Annual Meeting, October 19, Hotel Roanoke, Roanoke, Virginia.

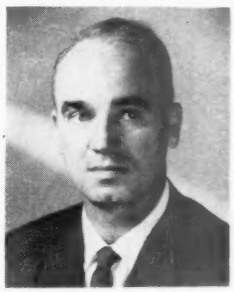
National Society of Professional Engineers—Fall Meeting, October 19-21, Hotel Roanoke, Roanoke, Virginia.

Professional Engineers of Oregon—Annual Meeting, November 10-11, Benson Hotel, Portland, Oregon.

Arkansas Society of Professional Engineers—Annual Meeting, November 17, Little Rock, Arkansas.

National Society of Professional Engineers—Winter Meeting, January 25-27, 1962, French Lick-Sheraton Hotel, French Lick, Indiana.

Committee Chairmen



◄ Mr. Mounfield

William P. Mounfield of Guerrant and Mounfield, Architects, Roanoke, Va., and Charles K. Whitescarver, Jr., P.E., of Sowers, Rodes and Whitescarver Engineers, Roanoke, are serving as co-chairmen of the general planning committee for the NSPE-AIA-VSPE meeting.

Mr. ► Whitescarver

Local Groups Prepare for 1962 Engineers' Week

Organizational planning for the 1962 National Engineers' Week, February 18-24, got underway at the state society and local chapter levels this month as NSPE launched preparations for the 12th annual observance held under the general sponsorship of the National Society.

The theme of the 1962 activity is "Economic Growth Through Professional Engineering." Promotional material for the Week is being sent to all NSPE state and local groups this month. The kits contain suggested ideas for developing a basic Engineers' Week chapter program concerning such projects as speakers' bureaus, newspaper publicity, exhibits and window displays, and the utilization of radio and TV.

Thirteen leading engineering figures have agreed to act as individual sponsors for the 1962 observance. They are: Wernher von Braun, director, George C. Marshall Space Flight Center, National Aeronautics and Space Administration; John L. Burns, P. E., president, Radio Corporation of America; William L. Everitt, P. E., dean of Engineering, University of Illinois; James F. Fairman, P. E., senior vice president, Consolidated Edison Company of New York; Ole Singstad, P. E., consulting engineer; Melvin F. Wood, P. E., chief engineer, E. I. du Pont de Nemours and Company; Leif Sverdrup, P. E., consulting engineer; George DeMent, P. E., commissioner of public works, City of Chicago; Frederick L. Hovde, president, Purdue University; Rex Whitton, P. E., federal highway administrator; Lt. Gen. W. K. Wilson, Jr., P. E., chief of engineers, Department of the Army; Francis K. McCune, P. E., vice president, engineering services, General Electric Company; and Rear Adm. E. J. Peltier, CEC, USN, P. E., chief of civil engineers.

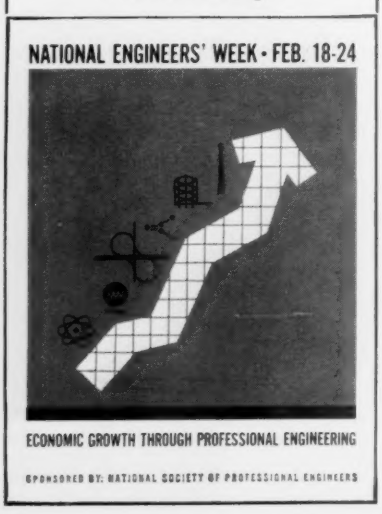
National chairman for the 1962 Week is Warren C. Stadden, a consulting engineer and architect of Roselle, N.J. Serving with Stadden on the Engineers' Week Committee are: Paul H. Johnson, Tulsa, Oklahoma; Walter D. Linzing, Chicago, Illinois; Noble T. McHugh, Drexel Hill, Pennsylvania; Rex A. Tynes, Albuquerque, New Mexico.

Mailings describing the activities and objectives of the Week will be made from NSPE headquarters to newspaper publishers, engineering magazines, consulting engineers, and engineering executives in industry.

The order form printed in this issue of the AMERICAN ENGINEER lists the promotional aids for Engineers' Week available from National Society headquarters. Deliveries on all materials will be made as soon as possible. Orders should be placed early in the fall. Additional copies of the printed order form, including prices, will be mailed to local chapters and state societies with the promotional kits.

The first in a series of Bulletins on the 1962 Week will be mailed from the National Society headquarters this month. The series of printed bulletins will offer suggestions for local Engineers' Week projects.

Poster Design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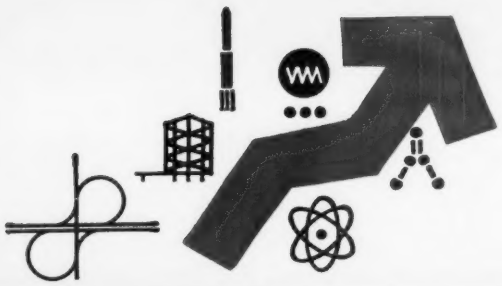

PROMOTIONAL AIDS FOR NATIONAL ENGINEERS' WEEK

Here are the basic promotional aids on which to build your Engineers' Week program. These items will give your program coverage in local newspapers, on radio and TV stations, and in civic and group displays. Use these promotional materials to emphasize engineering and economic growth.

1 **TV Spot Films:** A set of five 20-second TV films dramatizing the theme of the 1962 National Engineers' Week. Produced to meet network standards, the films call attention to the contributions of engineering to our national economic growth. Each film qualified for public service TV time during station breaks. A set of these five films will reach your largest Engineers' Week audience. Price: Set of five films, $25.

2 **Set of Seven TV Slides:** Obtain extensive TV coverage through the Week with these slides displaying poster-type art work and printed copy calling attention to engineering. May be used during all TV station breaks as public service announcements. Price: $10 per set of seven slides.

3 **Tape Recorded Radio Announcements:** A set of seven 20-second radio spot announcements, made by a network radio and TV announcer. Offers local station a top-level recording for 20-second station breaks. Price: Set of seven recorded announcements, $3.50.

4 **Postage Meter Plate:** Pitney-Bowes postage meter ad plate which imprints National Engineers' Week and the theme on first class mailings. Two meter model sizes: R (regular), and DM (desk model). Prices: Model R plate, $15; Model DM plate, $10.

5 **Posters:** Colorful 9x11-inch pasteboard posters carrying the 1962 Engineers' Week design and theme. This is the basic promotional item for calling attention to the Week. Use on bulletin boards, in window displays, school exhibits, etc. Large size (18x22 inches) also available. Prices: 9x11, $4 per 100; 18x22, $5 per 100.

6 **Paper Banners:** Excellent for display use. Three feet long by 6 inches wide. Has poster design and words "National Engineers' Week" in color. Price: $4 per 100.

7 **Bumper Stickers:** Gummed paper stickers, 15x3¾-inch carrying the words National Engineers' Week and a reproduction of the professional engineer's seal, in bright yellow on a black background. Prices: 100 to 500—15¢ each; 500 to 1,000—10¢; 1,000 to 3,000—7¢; 3,000 to 5,000—5¢; and over 5,000—4¢.

8 **National Engineers' Week Seals:** Use these brightly colored seals on all office mail from now through February 24. Poster design printed on 1½-inch gummed paper. Price: $3 per 1,000.

9 **Newspaper mat story on how engineering contributes to national economic growth:** A feature article describing how engineering knowledge and skill becomes the basis for increased job opportunity. Prepared on mat, with illustration, ready for immediate insertion in daily or weekly newspaper. Price: 75¢ each.

10 **Newspaper mat story on outstanding engineering accomplishments of the 20th Century:** A feature article listing and describing some of the engineering achievements which have brought us into the new era of rapidly expanding technology. Prepared on mat, with illustration, ready for immediate insertion in daily or weekly newspaper. Price: 75¢ each.

11 **Newspaper mat story on engineering and science:** A feature article explaining the chief differences between basic science and engineering. Prepared on mat, with illustration, ready for immediate insertion in daily or weekly newspaper. Price: 75¢ each.

12 **Logotype:** A metal cut of a poster design to insert in advertising, special sections of newspapers, industrial house organs, magazines, and other printed matter. All state society and chapter publications should have one. Price: $1 each.

USE THIS COUPON TO ORDER YOUR AIDS NOW!

1.....TV spot films @ $25 per set.
2.....TV slides: set of 7 slides @ $10 per set.
3.....Recorded spot announcement @ $3.50 per set.
4.....Postage meter plates: Model R @ $15 ea.; Model DM @ $10 ea.
5.....Posters: regular size @ $4 per 100.
Posters: large size @ $5 per 100.
6.....Banners @ $4 per 100.
7.....Bumper stickers: 100–500 @ 15¢ ea.; 500–1,000 @ 10¢ ea.; 1,000–3,000 @ 7¢ ea.; 3,000–5,000 @ 5¢ ea.; over 5,000 @ 4¢ ea.
8.....Seals @ $3 per 1,000
9.....Logotypes @ $1 ea.
10.....Newspaper mat stories on engineering and economic growth @ 75¢ ea.
11.....Newspaper mat stories on outstanding engineering accomplishments @ 75¢ ea.
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CITY.....STATE.....

By Mrs. Fred Johnson, Area Chairman, Western Area.

More and more women in the West have been identifying themselves as engineers' wives and organizing chapter auxiliaries. The September, 1961, count is nineteen in this area. New this year are Yakima, Bremerton, Pasco-Kinnewick-Richland in Washington, and the Peninsula and Stanislaus auxiliaries in California.

Special tribute should be paid to Washington State for the mushroom growth of its auxiliaries. Only two years ago the Seattle Chapter asked Mrs. Edward Kimbark to organize an auxiliary and shortly thereafter the Spokane Chapter established its auxiliary. Then with the stimulus provided by the prospective annual meeting of NSPE in Seattle this year, auxiliaries sprang up all over the state. Now there are seven with the addition of Tacoma, Walla Walla, Bremerton, Yakima and Pasco-Kinnewick-Richland.

At the national meeting in July, the seven participating auxiliaries planned and executed a lovely program for the entertainment of the ladies and children. The spectacular beauties of the Seattle area were charmingly displayed and enjoyed.

In Pasco last fall a state auxiliary was proposed and a committee under the temporary chairmanship of Mrs. Paul Symbol of Walla Walla, drew up a constitution patterned after that of the Pennsylvania Council of Chapters. In Seattle in July, the Washington ladies chose to organize on the advisory committee plan with three officers and a member from each auxiliary. Mrs. Symbol was elected their first chairman.

In the rest of the Western Area, there are two Arizona auxiliaries and one each in Idaho and Nevada. Oregon has only a state auxiliary. California has six active groups plus a reactivated auxiliary in San Fernando Valley starting this month.

Almost all established auxiliaries have grown well from their initial membership. The first western auxiliary in Fresno, California, grew from its original seven in 1953 to its present membership of 94. It is the oldest, the largest and probably the most active in the West. The next largest is at Boise, Idaho, with a membership of 76. It was formed in 1956 with 50 members. —**End.**

Ernest Williams, P. E.

Ernest Williams, P. E., a mechanical engineer who helped plan more than a thousand buildings in many parts of the world, died recently at his home in Scarsdale, N. Y. A graduate of Cooper Union. Mr. Williams was a life member of the New York Association of Consulting Engineers and member of the New York State Society of Professional Engineers.

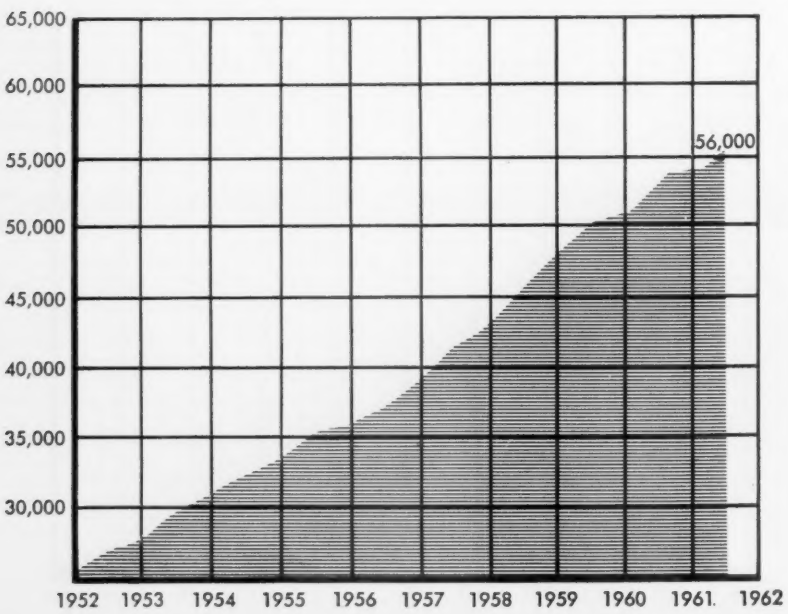
NEWNAM

(Continued from page 39)

crue to the governmental agencies utilizing qualified engineering firms for handling a large proportion of their engineering assignments. The private firms are working for many different clients and on many different types of jobs. It is inevitable, therefore, that they will be in a position, whether consciously or unconsciously, to bring more new ideas into play. An organization composed of the same people working on the same type of projects tends to become less creative. Also, there is a compelling incentive for the private firm to develop efficient methods of producing high quality engineering with greatest efficiency. Likewise the clients of private firms are usually more demanding in reducing construction costs. Government engineers, too, wish to be efficient and to keep both categories of costs as low as possible, but the same powerful incentive is absent. Funds for government work are based upon a budgetary or legislative appropriation; it is only necessary to obtain

(Continued on page 50)

NSPE Membership Chart



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"The Engineer in State Government" contains a number of tables which show, by state—

- Applicability of merit principles
- Policies on registration
- Policies on advanced education
- Policies on professional society participation

NOTE THESE CHAPTER HEADINGS—

- Coverage of Engineers by Merit or Civil Service Systems
- Registration Requirements and Policies
- Occupational Titles and Grade Levels
- Educational and Experience Requirements
- Educational Opportunities
- Professional Society Participation

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ENGINEER: Project level postion open in Houston, Texas, area with established engineering and construction firm. Minimum qualifications: BS-CHE Degree, 8 years experience in design water treatment units for power plants and sanitary and sewage treatment plant; ability to perform all phases of design, engineering including the necessary calculations, specifications, and feasibility studies. Desirable also to have operating experience. Duties include supervision and coordination of engineering, drafting, and requires customer contact. Normal fringe benefits. Submit two copies of complete résumé with photograph to: Box 1004, AMERICAN ENGINEER.

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this appropriation in order to be able to do the engineering and the construction.

If there were no other reason, private engineering services should be utilized in order to promote the economic development of the Nation through the encouragement of private enterprise. There is actually no more reason for the government to do all of its engineering than for it to manufacture either the reams of paper it uses or the construction materials that go into its projects. This is not, however, a sufficient reason. It is in the public interest to give proper consideration to the relative costs of producing engineering services.

That those government agencies which have made the greatest use of private engineering firms have accomplished their engineering at the lowest cost has been demonstrated many times. Conversely, those agencies which make the least use of private engineering services have incurred the highest engineering costs. A recent documentation of this is in the survey report entitled, "The Role of the Consulting Engineer in Federal Public Works Projects," as published by the National Society of Professional Engineers. Also, the engineering division of the American Road Builders' Association has made comprehensive studies of the comparative costs of engineering furnished by private engineering firms versus that supplied by the state highway department, but the results have not yet been released.

To the uninitiated, there immediately arises the question, "How can this be, for the private engineering firms obviously must make a profit to stay in business, whereas the government engineering staff does not." The answer to this question lies not in the quality of engineers, for the same range of quality can be found in both fields. Rather, it lies in the nature of the operations of the two groups. The private engineer is working for many and varied clients and therefore can keep his staff busy. Also his working time limits are usually short and his personnel are trained to become fast and efficient. Another reason is that the government engineering staff which can handle

even a part of their overload is obviously over-staffed during the periods of slack work. In government services, these additional people are seldom laid off, rather the tendency is to stretch the work out to make it fit the staff. Some agencies even actively look for, and promote, additional government work, rather than doing only that which is essential and actually required by the public.

Regardless of survey results, the most telling evidence of the low cost and high efficiency of work accomplished by private engineering firms is that they are extensively used by industry. Many of these industries actually have their own engineering staffs and work under tight budget controls. They use private engineering services for a large part of their work because they have found such use to be economical, efficient, and wholly satisfactory.

On the other side of the picture, there may be some few consultants who would advocate that all government engineering be done by private engineering firms. This is neither realistic nor in the best public interest. There are many phases of any agency's engineering work that should be handled by its own permanent staff.

After considering all these factors, it is recommended that the following general policies should be followed by government agencies in carrying out their engineering assignments in a manner that would be to the best interest of the public:

(1) The government engineering staff should handle the general planning, budgetary considerations and contacts with local interests on their engineering projects.

(2) The government engineering staff should supervise, coordinate, and furnish general standards for all engineering design and supervision of construction, including that done by its own personnel, as well as that done by private engineering firms.

(3) The government engineering staff should have sufficient specialists and handle certain types of design that are done only by its agency and not readily available through private engineering firms.

(4) The government engineer-

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ing staff should not be greater (and preferably smaller) than is needed to handle the minimum work load that would occur over a period of several years.

(5) Private engineering firms should be engaged to handle all other engineering design and supervision of construction.

(6) Maintenance and operation of the project should normally be handled by the government engineering staff.

It is believed that the above policy would normally result in: A large part of the engineering design being accomplished by private engineering firms; the over-all cost to the public being less; a reservoir of talented private engineering firms would be available for use in support of our national security; a maximum of new ideas and diversity of engineering talent being brought into play in the development and improvement of the projects themselves; the private engineers in turn being able to incorporate the new developments of the government into the economy of the Nation on other projects; all engineers and the public in general being able to reap untold benefits from such procedure.

Clearly, there is room for both government and private engineers to work together as a team for the benefit of the Nation, with maximum use of private engineering firms being made by each government agency. The National Society of Professional Engineers, at its July, 1961, meeting, reaffirmed its endorsement of its Rules of Professional Conduct which support this general policy.—End

About the Author . . .

Mr. Newnam

Frank H. Newnam, Jr., P. E., received his B. S. in civil engineering from A&M College of Texas and did graduate work in soil mechanics and foundations at the University of Texas. He joined the firm of Lockwood, Andrews & Newnam, Inc., as partner and executive

vice president in 1946. He is a member of ASTM, SAME, AIChE, ASPA, and AWWA. He is registered in Texas, Louisiana, Wisconsin, Virginia, and New Mexico. He has written several books and numerous technical publications on the subjects of port and harbor developments, water supply projects, paving design and earthwork control.

NYQUIST

(Continued from page 28)

who graduated with honors from high school, experienced considerable difficulty with the engineering courses in college, largely because they had never really been under sufficient pressure in high school to cause them to learn how to study. If the incoming students to our colleges and universities came with a better foundation as described, the task of acquainting and educating college students in the awe-inspiring complexity of modern technology would be much easier.

Previously, I indicated industry had no quarrel with present educational methods. Suggestions for possible improvement might include consideration of the following, many of which have been incorporated into the curricula of our universities and colleges:

- Standardize on a five-year or longer course in each engineering and scientific field. Specializing in a specific field by the student, for example in electrical engineering, will enable industry to more quickly utilize the graduate engineer and to evaluate and develop his potential.
- Increase the requirements in math, physics, and chemistry and possibly require mastering of one basic language in addition to English.
- For engineering students, increase the time allotted to drawing, both mechanical and freehand. I am sure a howl of protest from engineering educators will develop regarding this statement, but we find that the engineer who can accurately and quickly portray his ideas on the drawing board or free-hand sketch pads has a distinct advantage.
- Broaden the scope and possibly the length of institute courses for training of technicians to be-

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come the working assistants of the engineer and scientist. Industry has been long accused of using engineers where draftsmen, technicians, or clerical personnel would have sufficed. That criticism is partly true, because we find that the graduate engineer and scientist who has been trained to quickly and accurately think in terms of *how, what, when, where,* and *why* completes the work faster, more accurately and ultimately at lower cost. Increasing availability of better trained technicians and draftsmen will permit industry to use engineers and scientists more effectively.

Engineers and scientists in industry form a management pool for promotion into supervisory and management positions, due to their training in analytical reasoning. A recent issue of "The Lamp," published by Standard Oil Company of New Jersey, one of the world's largest corporations, indicated that eight of the eleven top officers promoted were engineers.

• Outside of the additional stress on drawing I mentioned previously, please do not consume the limited time of the student engineer or scientist teaching him the jargon and application of engineering to a specific industry. Let his employer teach him the "tricks of the trade."

In conclusion, industry expects that the engineering or science graduate of the 60's will be as well equipped technically as his predecessor; have a more broadened knowledge of other fields of engineering and science; have mastered at least one foreign language; and be willing to become an industry team player, not a prima donna. He should be willing to work long hours, both in his work and to further his technical and academic training, sometimes without the hope of immediate cash return. He should be trained to think in terms of reducing costs to a practical minimum, to use the available materials and tools most efficiently, keeping ever uppermost in his mind the competition of Europe, Asia, and South America, recognizing and never underestimating foreign ability and technological proficiency.—End.

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fined as the formal or informal submission, or receipt, of verbal or written estimates of cost or proposals in terms of dollars, man days of work required, percentage of construction cost, or any other measure of compensation whereby the prospective client may compare services on a price basis prior to the time that one engineer, or one engineering organization, has been selected for negotiations. The disclosure of recommended minimum or median fee schedules prepared by various engineering societies is not considered to constitute competitive bidding.

Suggested Procedures for Negotiating—It is the policy of the Society that:

(1) Any governmental unit, individual or corporation desiring to procure the services of an engineering consultant or organization which is unacquainted with the practitioners in the branch of engineering covering the contemplated work, should secure from the best available sources the names of several practitioners, and

(2) The client should discuss the proposed project with a practitioner or practitioners, considering background, experience, staff qualifications, present work load, and other factors deemed relevant for the successful handling of the project assignment.

(3) After taking into consideration all of the pertinent factors, except fee, the client should select a firm for the work, subject to negotiation of a satisfactory contract.

(4) In the event the client and selected firm are unable to negoti-

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ate a satisfactory contract, including fee, the selected firm should be notified, in writing, that it is no longer being considered, and the client should proceed with similar discussions with another firm in the same manner, and thereafter if the second negotiations are unsuccessful until satisfactory arrangements have been concluded with a qualified firm.

Discussion:

Rule 48 is a clear prohibition of competitive bidding for professional engineering services, and Rule 49 reinforces the injunction against competitive bidding by declaring it specifically to be an unethical practice. The only question to be resolved on the basic point is whether compliance with the client's request would constitute competitive bidding.

NSPE policy defining competitive bidding, stipulates that the professional engineer should not provide information at the preliminary interview which may form the basis for price comparison. Likewise, the policy makes it clear that the initial interview should be solely to determine the qualifications and availability of the consultant for the project and that the fee should not be discussed until a firm has been selected for the work. The only exception is that the consultant may submit a recommended minimum or median fee schedule prepared by an engineering society for the general information of the prospective client. The rules and policy, read together, therefore, state that the consultant should not provide the prospective client with a statement of probable charge prior to his selection for the work.

Rule 49 is mandatory in requiring a professional engineer who is requested to submit a competitive bid to remove himself from further consideration for the work. We would read into this language, however, the opportunity for the professional engineers in this circumstance to advise the owner of the appropriate rules of ethical conduct and to suggest that the owner withdraw his request for competitive bids. The consultants may proceed with the discussion of qualifications and availability. Each firm is obligated to withdraw from consideration if required to submit estimates of charges for the work (except general reference to a suggested minimum or median fee schedule of an engineering society) prior to being selected for the work.

Conclusions:

Q. 1.—The firms may not ethically provide the client with a statement of the estimated charges for engineering services prior to selection for the work, as to do so would constitute competitive bidding.

Q. 2.—Each engineering firm is obligated to withdraw from further consideration if required to submit information which would enable the client to make price comparisons prior to selection of a firm for the work.

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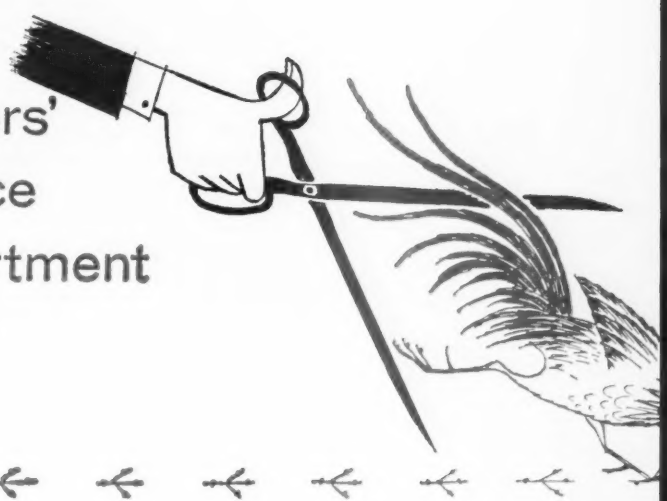

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Then if you want more information about any item, simply circle the corresponding number on the form, sign, fold, fasten and MAIL TODAY!

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October, 1961

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.....

My Name ..... **Title** .....

Company Name .....

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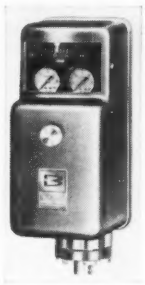
City ..... **Zone** ..... **State** .....

Progress in Products

DATA PROCESSING — Item 30

Burroughs Corp. has integrated its Series E desk-size computer with a ten-total typewriter accounting machine to provide the only electronic business data processing system in its price range with alphanumeric capability which eliminates the need for additional units to write descriptive information on accounting forms. It puts electronic data processing capacity within reach of small and medium sized businesses. Programmer training takes just a few hours.

TRANSMITTERS — Item 31



A new line of level control instruments, including electric and pneumatic transmitters that also provide indication and can perform alarm and "on-off" control functions, has been introduced by the Brooks Instrument Co. They can be supplied in special materials for toxic, corrosive, and high-pressure (to 40,000 psi) services. They are available with buoyant and displacer floats for liquid or interface-level or specific-gravity applications.

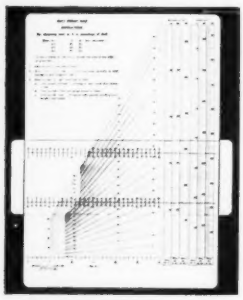
DEVELOPER — Item 32

A new diazo print developer, the Rotolite Thermomatic, developed by Rotolite Sales Corporation features a coated roller which speeds up the action of the ammonia developer. This feature also produces for the first time on low cost whiteprinters completed development on black line prints and sepias. The thermomatic weighs only 30 pounds and is designed for wall mounting, which means no floor or desk space needs to be tied up with copying equipment. Sizes range from models taking paper up to 18" wide by any length, to those taking paper up to 42" wide by any length.

SPLICE PLATES — Item 33

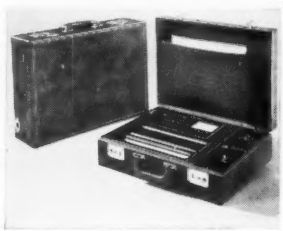
Newly designed splice plates that reduce the cost of fittings 50 per cent and cut installation time 40 per cent on all Chalfant Cable Tray Installations, have been announced by The Chalfant Products Company, Inc. The new plates, having special crimping slots on each end, slide onto the cable tray rails and are held tightly and securely in place by crimping. Made of aluminum, galvanized steel and aluminized steel, they travel in all degrees of vertical and horizontal directions where small radius fittings are normally used; may be purchased and stocked for use as needed.

DUCT WEIGHT RULE — Item 34



Carl Raymond & Co. has introduced a new Duct Weight Rule designed to give calculations in seconds for square footage & pounds of rectangular and round duct up to 100 feet in length; 0 to 120 inches semiperimeter and metal gauges to ashrae standards. The rule is handy for estimators, engineers, insulation estimators, sheet metal field and shop personnel.

PORTABLE COPIER — Item 35



A completely portable photocopier that can be taken into libraries, halls of records and other reference sources and used to copy originals from books, ledgers and deed records, whether flat or contoured has been introduced in an attache case by Anken Chemical & Film Corp. It can be used in daylight or under artificial lighting conditions.

GIFT BOOKARD — Item 36

New products are the principal theme in this year's Gift Bookard line as announced by Automated Gift Plan, Inc. Especially designed to simplify Christmas gift-giving for the businessman's customers or employees, the 1961 Gift Bookard line consists of eight different booklets in price ranges from $7.50 to $100 each. The basic idea, is that the recipient selects any one gift from this breath-taking assortment and sends an attached card to Automated who fulfills the request so the busy executive has had nothing to do but mail out the card.

HYDRAULIC TABLE — Item 37

A new turn has been given to drafting with the creation of a hydraulic drafting table by Isis Incorporated Precision Instruments. The Nike table rotates in a full circle to assure the best lighting, privacy, storage when not in use, and efficient office arrangements. Adjusts to any heights or angle. The board is constructed of solid materials for longer wear, and comes in sizes of 40" x 60" or made to order.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.

Texas Interstate 35E, Stemmons Freeway out of Dallas.

Texas' 352 miles of Interstate awarded to CONCRETE promise big savings in upkeep!

Across Texas, modern concrete highways grow in length—a public reminder of the skills and dedication of the engineers and builders who are creating them.

A solid future is built right into roads like these. Only concrete enables engineers to design pavements to last 50 years and more.

Concrete isn't flexible, so there are no "moving parts" in it to cause hidden wear. And even with the highest temperatures, it won't soften and ripple under traffic. Concrete actually grows stronger year by year.

All these advantages mean extra thrift for Texas as it builds with concrete: Exceptional pavement life . . . upkeep costs that run far less than for asphalt. It's for reasons like these that most Interstate mileage across the nation today is going to concrete.

Texas Interstate 20, Dallas—Ft. Worth Turnpike.

38% maintenance saving with concrete, Texas' 31-year records show!

Official Texas State Highway Department records give the facts: Since 1929, road maintenance costs per mile per year for concrete have averaged $144.68; for asphalt, $235.23. Texas' new concrete highways will do even better!

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete